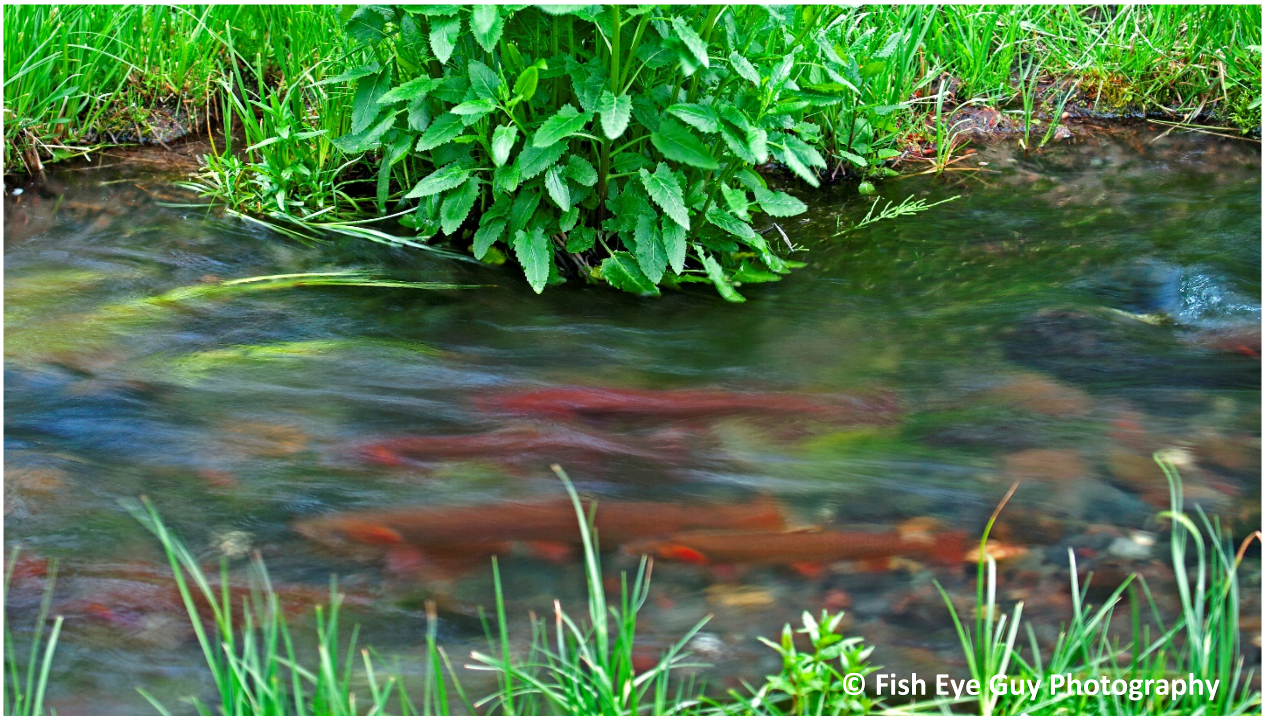
Buffalo Creek Yellowstone Cutthroat Trout Conservation



Reclamation of Buffalo Creek for Yellowstone Cutthroat Trout
Draft Environmental Assessment
2021

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Executive Summary

Yellowstone cutthroat trout are a natural treasure and an icon of Yellowstone National Park and the Absaroka-Beartooth Wilderness; however, nonnative rainbow trout in Buffalo Creek threaten the Yellowstone cutthroat trout in legendary streams in the Lamar River watershed. Rainbow trout breed with cutthroat trout yielding fertile hybrids that continue to spread nonnative and harmful genes through a population, and if left unchecked, this hybridization threatens the entire Lamar River population of cutthroat trout found in 352 stream miles in the basin. The Lamar River watershed straddles the boundary of the Nation's first park and the Absaroka-Beartooth Wilderness. Watershed level strongholds for Yellowstone cutthroat trout are increasingly rare, and protecting this population is critical in warding off more losses and in securing this species that is emblematic of Yellowstone National Park, is a key component of the natural character of the area and brings great joy to visitors. Conserving these fish is a requirement under state and federal law and is a moral obligation to future generations.

Yellowstone cutthroat trout (Figure 1) are native to the Yellowstone River watershed and have outstanding ecological, historical, and recreational value. (See the Yellowstone cutthroat trout story map[1] for background on this Montana native). This stunning fish has declined substantially in distribution and abundance, with nonnative species and habitat degradation being primary drivers of their decline. Rainbow trout are nonnative and have been the biggest cause of loss of Yellowstone cutthroat trout. Climate change is working to further limit suitable habitat for Yellowstone cutthroat trout, and high elevation strongholds like Yellowstone National Park and the Absaroka Mountains are among the few places Yellowstone cutthroat trout will be able to persist over the next few decades.

[1] https://mtfwp.maps.arcgis.com/apps/Cascade/index.html?appid=fdf5c7af3413435da2c2190aab5ef9c3

Figure 1. Yellowstone cutthroat trout in their native habitat.

This project proposes to remove nonnative rainbow trout from the Buffalo Creek watershed within the Absaroka-Beartooth Wilderness to its confluence with Slough Creek in Yellowstone National Park. Slough Creek is a highly valued Yellowstone cutthroat trout fishery; however, rainbow trout and hybrids have been found with increasing frequency over the past decade. The primary goal of this project is to remove rainbow trout from the Buffalo Creek watershed, which would protect the genetic integrity of Yellowstone cutthroat trout in the Lamar River basin. Native Yellowstone cutthroat trout in the Nation's first national park are a national treasure with immeasurable ecological, historical, and recreational value. Conserving Yellowstone cutthroat trout would secure part of Yellowstone National Park's natural legacy and allow future generations to experience part of the genuine Yellowstone experience.

A secondary benefit of the proposed action is that it would establish a secure population of nonhybridized Yellowstone cutthroat trout in Buffalo Creek. Climate change is constricting the amount of habitat suitable for Yellowstone cutthroat trout within their historic range. The project area is at high elevation and predicted to remain thermally suitable for Yellowstone cutthroat trout for the foreseeable future.

Rainbow trout would be removed using a formulation of rotenone that targets fish and can kill some invertebrates; however, its toxicity is short-lived. Aquatic invertebrate populations recover typically within a year after treatment. The rotenone formulation is safe for terrestrial wildlife and humans. Deactivation of rotenone at the downstream end of the project area would limit the spatial extent of affected waters.

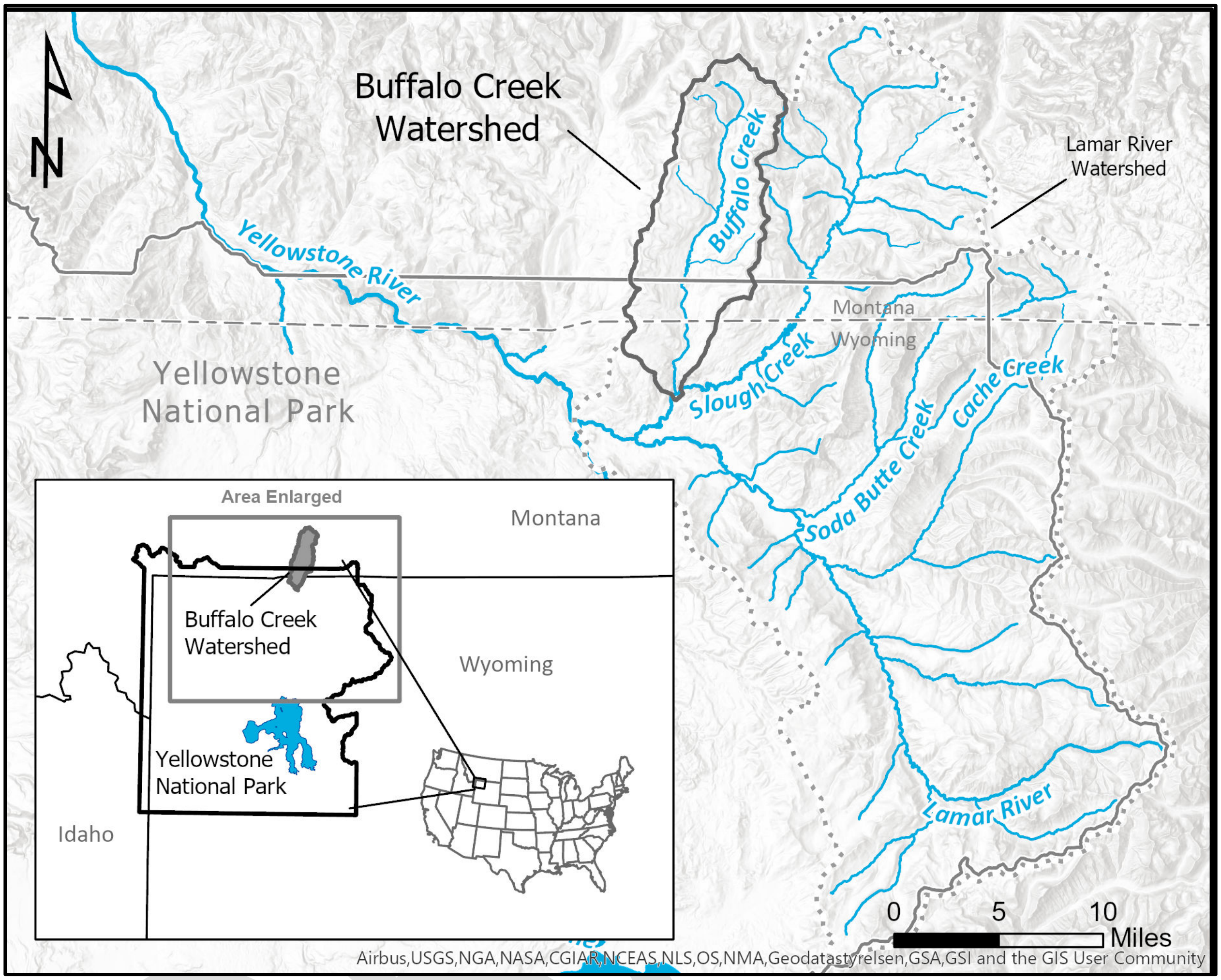

Figure 2. Map of Buffalo Creek within the Lamar River watershed.

This project would be a collaboration among Montana Fish, Wildlife & Parks (FWP), the Custer Gallatin National Forest (CGNF), and the National Park Service (NPS) the project is consistent with each agency's established strategies for conserving Yellowstone cutthroat trout and their legal obligations to conserve native trout. These agencies regularly collaborate on projects that conserve native trout.

The Montana Environmental Policy Act (MEPA) and the National Environmental Policy Act (NEPA) require state and federal agencies to engage the public, develop a range of alternatives, and to consider the environmental, social, cultural, and economic effects of proposed actions. This Environmental Assessment (EA) considers the potential consequences of three alternatives to restore Yellowstone cutthroat trout to Buffalo Creek and eliminate a source of nonnative rainbow trout genes within the Lamar River watershed. This EA evaluates three alternatives:

1. Removal of rainbow trout using rotenone and establishing a secure population of Yellowstone cutthroat trout within the Buffalo Creek watershed.
2. No Action
3. Removal of rainbow trout and leaving the watershed fishless

Two other alternatives were considered but rejected, as they would not meet the project's primary goal of eradication of rainbow trout in the project area.

- Mechanical removal using electrofishing and nets
- Angling

Alternative 1 is the proposed action. It would have short-term, minor effects on wildlife, wilderness character, recreation, and vegetation. This alternative would be highly beneficial to Yellowstone cutthroat trout within the Lamar River watershed, as rainbow trout present the biggest risk to this world-renowned fishery. The project would contribute considerably to the persistence of Yellowstone cutthroat trout in America's first national park and the Absaroka-Beartooth Wilderness. Stocking catchable Yellowstone cutthroat trout into Hidden Lake would mitigate for the short-term loss of angling opportunities.

MEPA and NEPA require public involvement and opportunity for public comment on projects undertaken by the acts' respective agencies. A public comment period will extend from March 19, 2021 to April 21, 2021 until noon. A virtual public meeting may be held if interest in the project warrants.

Comments can be emailed to: fwpregion5pc@mt.gov Please use header, **"Buffalo Creek Project"** or mailed to Montana Fish, Wildlife & Parks, **"Buffalo Creek Project"**, 2300 Elmo Lake Drive Billings, MT 59105. For questions or to leave a phone message please contact Mike Ruggles, Fisheries Manager at (406) 247-2961.

Comments pertaining to the U.S. Forest Service decision whether to authorize the proposed application of piscicide and associated motorized equipment operation in the Absaroka Beartooth Wilderness should be submitted to the U.S. Forest Service either:

- Electronically (preferred): in Word, PDF, or excel format, through the Forest Service's CARA database:

  https://cara.ecosystem-management.org/Public/CommentInput?Project=59630

- By Mail:

  ATTN: Buffalo Creek Yellowstone Cutthroat Trout Conservation
  Gardiner Ranger District
  PO Box 5
  Gardiner, MT 59030.

- Or hand delivery during regular office hours (8:00-4:30 Monday through Friday):

  Gardiner Ranger District
  805 Scott Street
  Gardiner, Montana

Table of Contents

List of Figures

List of Tables

1 PROPOSED ACTION and BACKGROUND

1.1 *Need for Proposed Action*

This project is a native fish conservation project designed to remove the immediate threat nonnative rainbow trout pose to Yellowstone cutthroat trout in the Lamar River watershed within Yellowstone National Park (Figure 3). Yellowstone cutthroat trout are integral to the natural character of these wildlands; however, a population of rainbow trout in Buffalo Creek (Heim 2019), and the resulting hybridization threatens Yellowstone cutthroat trout throughout the Lamar River watershed. Removing rainbow trout using rotenone would eliminate the primary source of hybridization in the Lamar River watershed. The project would also establish a secure population of Yellowstone cutthroat trout within an area in Montana that will remain cold enough to support Yellowstone cutthroat trout despite our warming climate (Isaak et al. 2017). Climate change is shrinking suitable habitat for Yellowstone cutthroat trout within the historic range, this project would offset losses occurring elsewhere by establishing a protected population of Yellowstone cutthroat trout upstream of a barrier waterfall.

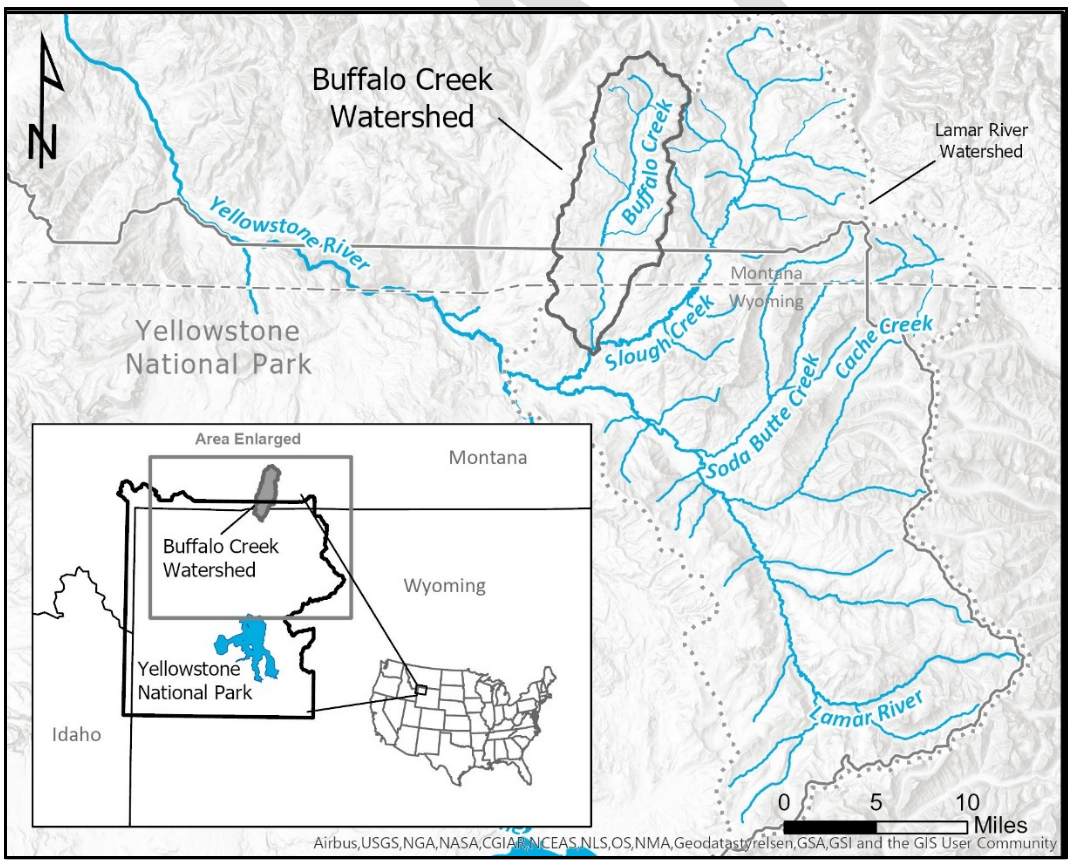

Figure 3. Buffalo Creek project area within the Lamar River watershed.

Yellowstone cutthroat trout have tremendous ecological, historical, recreational, and economic value (see Yellowstone Cutthroat Trout Story Map for background on this Montana native). Yellowstone cutthroat trout are the top predator in the waters in their historical range and in turn provide sustenance to other iconic species like bald eagles, river otters, osprey, and endangered grizzly bears. Early explorers and settlers exploited this abundant resource, and today, anglers come from around the world to catch native Yellowstone cutthroat trout in Yellowstone National Park and the adjacent wilderness area for an unparalleled back country experience. Yellowstone cutthroat trout embody much of what makes the Absaroka-Beartooth Wilderness and Yellowstone National Park special.

Yellowstone cutthroat trout have declined substantially in distribution and abundance and now occupy 44% of their historically occupied habitat range wide (Figure 4). In Montana, Yellowstone cutthroat trout remain in 33% of their historical range. More loss of occupied habitat is predicted with climate change (Isaak et al. 2017), and nonnative fishes decrease the ability for Yellowstone cutthroat trout to remain in some occupied habitat. Finding secure habitat and protecting the high elevation populations are conservation priorities.

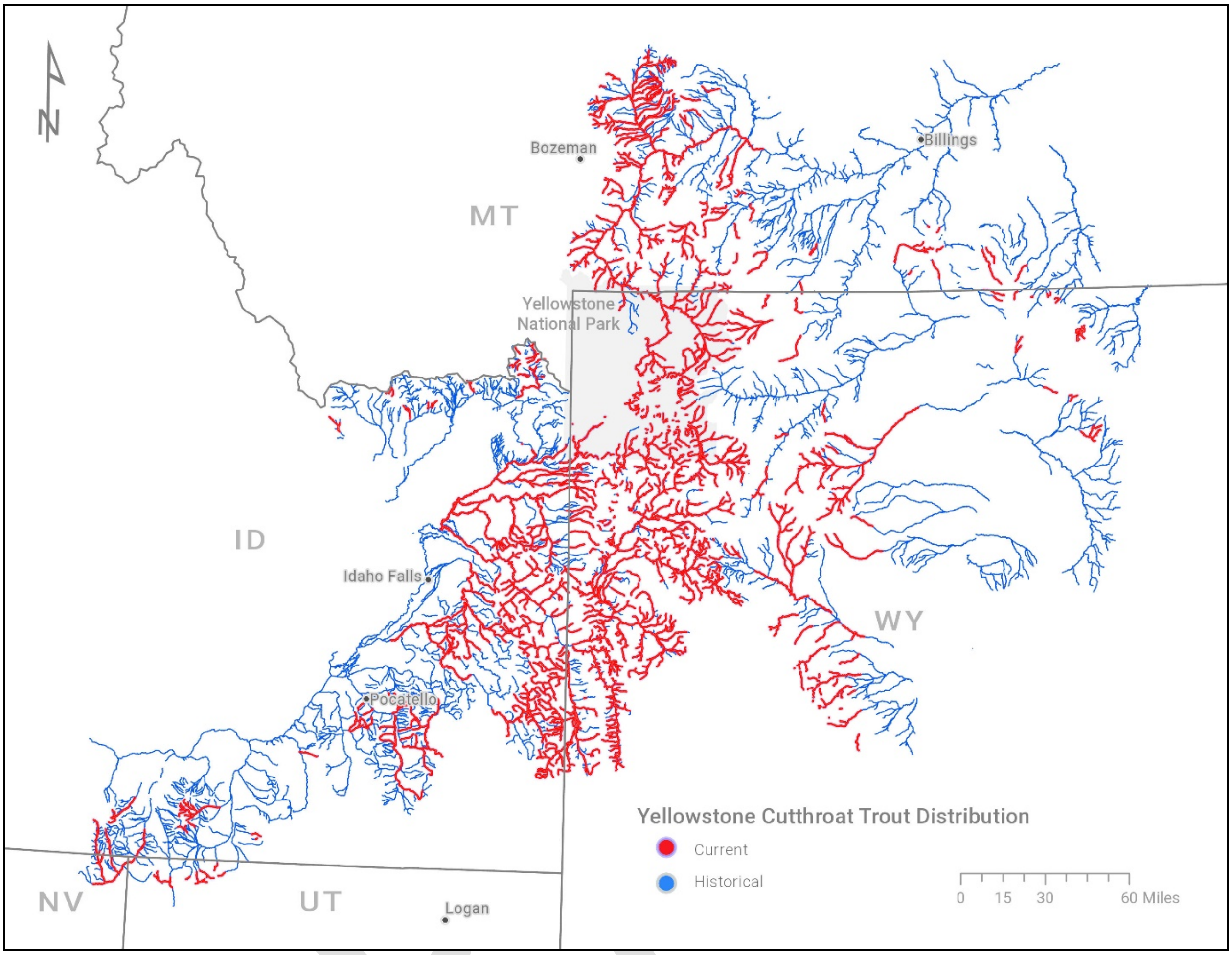

Figure 4. Historical and current range of Yellowstone cutthroat trout.

Nonnative fishes, habitat degradation, stream dewatering, and passage barriers are the major causes of decline of Yellowstone cutthroat trout. The warming climate has added another stressor that is constricting the amount of habitat that will remain suitable for Yellowstone cutthroat trout (Isaak et al. 2015). High elevation refuges like the Buffalo Creek watershed will likely be the last strongholds for many native trout.

Rainbow trout are the biggest contributor to the decline of Yellowstone cutthroat trout (Kruse et al. 2000). Rainbow trout were stocked into Yellowstone cutthroat trout habitat by the millions for several decades. These closely related species readily interbreed, yielding fertile hybrids. Hybridization is especially detrimental, as genes from other species alter the features that make nonhybridized Yellowstone cutthroat trout distinct. The alien genes also greatly decrease the fitness of even slightly hybridized fish (Muhlfeld et al. 2009). The onslaught of rainbow trout into Yellowstone cutthroat trout habitat eventually swamped them out of existence in much of their range.

The Buffalo Creek watershed was historically fishless upstream of a barrier waterfall near the boundary of Yellowstone National Park; however, Hidden Lake was stocked with rainbow trout in 1935. The progeny of this stocking event are spreading throughout the watershed and have expanded downstream into the Lamar River drainage resulting in presence of rainbow trout and rainbow trout × Yellowstone cutthroat trout hybrids (Heim 2019). Rainbow trout and the hybrids pose a direct threat to Yellowstone cutthroat trout and the natural character of Yellowstone National Park. Yellowstone cutthroat trout would benefit from removal of rainbow trout and continue to swim in their ancestral waters with reduced risk of hybridization. Future generations would experience the natural character of Yellowstone National Park and the Absaroka-Beartooth Wilderness.

The Buffalo Creek watershed is an ideal location to establish a secure population of nonhybridized Yellowstone cutthroat trout. A waterfall at the boundary of Yellowstone National Park would protect the population from invasion of rainbow trout and hybrids present in Slough Creek. The falls is at a slope with a drop of 12 feet and is a total barrier to upstream fish migration (Figure 4). Climate Shield data project a 33% decline in thermally suitable YCT habitat across the Lamar River drainage by the year 2080 (Isaak et al. 2017). However, the project location is within an area predicted to be highly resilient to climate change, and 43 streams miles in the watershed have a 90 to 100% probability of remaining thermally suitable for Yellowstone cutthroat trout by 2040, whereas many neighboring waters have a lower probability of remaining suitable for Yellowstone cutthroat trout (Figure 6). The project area would provide 47 miles of fish-bearing stream and a lake upstream of the barrier falls, which would support a large population with potential for diverse life strategies. These characteristics would contribute to resilience of a YCT population against future hybridization, disease, natural disturbance, and climate change threats.


Figure 5. Barrier falls on Buffalo Creek near the boundary of Yellowstone National Park.

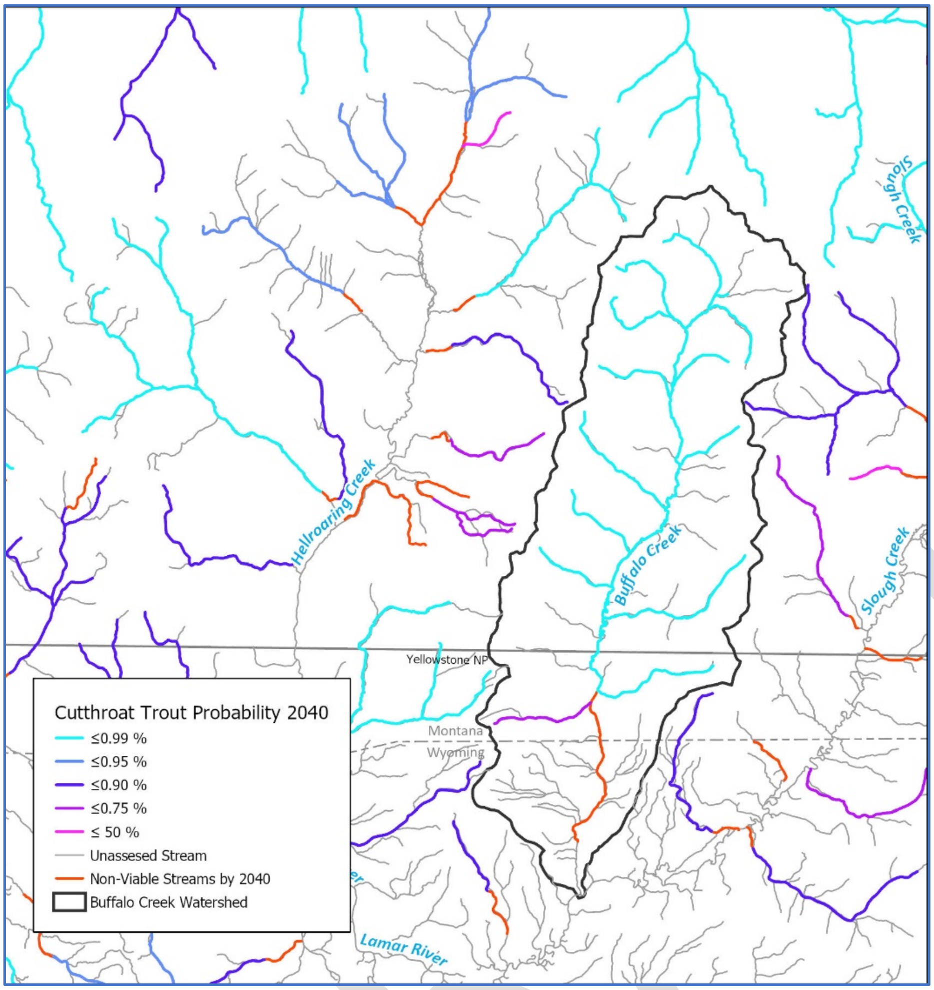

Figure 6. Probability of remaining suitable habitat for Yellowstone cutthroat trout by 2040 (Isaak et al. 2017).

1.2 *Goals of Proposed Action*

The primary goal of the proposed action is to eliminate the source of rainbow trout that are causing increasing hybridization of a population of Yellowstone cutthroat trout that had not shown signs of hybridization until a decade ago (Heim 2019). Eliminating rainbow trout in the Buffalo Creek watershed would be protect the Yellowstone cutthroat trout fishery in Slough Creek and the larger Lamar River watershed. Protecting this invaluable resource is among the highest conservation priorities for Yellowstone cutthroat trout in Yellowstone National Park and Montana, and the rate of hybridization calls for quick action.

The secondary goal of the project is to establish a secure population of nonhybridized Yellowstone cutthroat trout in an area that should remain cold enough for Yellowstone cutthroat trout into the foreseeable future. Climate modeling predicts this area will be among increasingly rare areas to protect native Yellowstone cutthroat trout (Figure 6).

1.3 *Montana Fish, Wildlife and Parks Authority for Proposed Action*

The proposed action is consistent with state and federal law, and relevant planning efforts to conserve Yellowstone cutthroat trout within their native range. Montana state law provides FWP with the authority for implementation of fish management and restoration projects (MCA § 87-1-702; § 87-1-201[9][a]). In addition, Montana state law authorizes FWP to manage wildlife, fish, game and nongame animals to prevent the need for listing under the Endangered Species Act, and listed, sensitive, or species that are candidates for listing under the ESA must be managed in manner that assists in the maintenance or recovery of the species (MCA § 87-5-107). In waters where FWP is seeking to remove or control unauthorized species, FWP must endeavor to protect the previously existing fishery and suppress or eradicate the unauthorized species to maintain the existing management objectives for that fishery (ARM 12. 7. 1501[4]). Montana state law also allows the use of chemicals to remove fish (ARM 12. 7. 1503[1][f][ii]).

Planning documents and strategies developed by agencies and collaborating entities also provide official justification for the proposed action (Table 1). These include conservation agreements among stakeholder groups, state and federal laws, and agency plans designed to conserve and protect Yellowstone cutthroat trout within its native range. Combined, these documents define threats to and status of Yellowstone cutthroat trout within its native range, prioritize conservation concerns, and provide guidance on ways to implement projects.

Table 1. Planning and strategy documents with relevance to conservation of Yellowstone cutthroat trout in Buffalo Creek.

Agency	***Citation***	***Website***
FWP	Yellowstone Cutthroat Trout Conservation Strategy for Montana	http://fwp. mt. gov/fishAndWildlife/management/yellowstoneCT/
FWP	Piscicide policy (FWP 2017)	Internal document
FWP	Statewide Fisheries Management Plan (FWP 2019)	http://fwp. mt. gov/fishAndWildlife/management/fisheries/statewidePlan/
Montana Cutthroat Trout Steering Committee	Memorandum of Understanding and Conservation Agreement for Westslope Trout and Yellowstone Cutthroat Trout in Montana (MCTSC 2007)	http://fwp. mt. gov/fishAndWildlife/management/yellowstoneCT/
Multiple	Memorandum of Agreement for Conservation and Management of Yellowstone Cutthroat Trout among MT, ID, WY, NV, U. S. Forest Service YNP, Grand Teton National Park. (May 2000)	http://www. fws. gov/mountain-prairie/species/fish/yct/archive/Microsoft%20Word%20-%20YCT-MOU. pdf
NPS	Native fish Conservation Plan Environmental Assessment (NPS 2010)	http://parkplanning. nps. gov/document. cfm?parkID=111&projectID=30504&documentID=37967
U. S. Congress	Wilderness Act of 1964	https://www.fsa.usda.gov/Assets/USDA-FSA-Public/usdafiles/Environ-Cultural/wilderness_act.pdf

The Montana Cutthroat Trout Steering Committee developed a conservation agreement signed by state and federal agencies, conservation organizations, and representative groups for agriculture, mining, and timber harvest (MCTSC 2007). Signatories, which include FWP, the CGNF, and the NPS, agree to conserve Yellowstone cutthroat trout throughout its historical range.

Conservation goals developed for cutthroat trout in in the MOU include:

- Ensure the long-term, self-sustaining persistence of each subspecies distributed across their historical ranges.
- Maintain the genetic integrity and diversity of nonhybridized populations, as well as the diversity of life history strategies represented by remaining cutthroat trout populations; and

- Protect the ecological, recreational, and economic values associated with cutthroat trout.

Objectives developed to meet conservation goals are consistent with the need for the proposed action. The relevant objectives are as follows:

- Maintain, secure, and/or enhance all cutthroat trout populations designated as conservation populations, especially the nonhybridized components;
- Continue to survey waters to locate additional cutthroat trout populations and determine their distribution, abundance, and status; and
- Seek collaborative opportunities to restore and/or expand populations of cutthroat trout into selected suitable habitats within their historic ranges.

This project meets several goals and objectives of the cutthroat trout conservation agreement and is a priority under the National Park Services Native Fish Conservation Plan (NPS 2010). Invasion of rainbow trout into upper Slough Creek was discovered in the 2000s, and rainbow trout hybridization has continued to increase in the Lamar River drainage since then (NPS 2010). Heim (2019) determined that "spatial patterns of invasion point to Buffalo Creek as the single contemporary source of rainbow trout in the (Lamar) watershed." The NPS is addressing spread of rainbow trout genes in Slough Creek through mechanical removal of rainbow trout and hybrids with electrofishing and removal by anglers (NPS 2010). If rainbow trout are not removed, the Buffalo Creek watershed would be a perpetual source of rainbow trout genes bleeding into a highly valued fishery in Yellowstone National Park. Yellowstone cutthroat trout are a key part of the Yellowstone National Park's natural heritage and have rich ecological, historical, recreational, and economic value. Moreover, failing to act would not be consistent with the agreement developed for conservation of cutthroat trout in Montana (MCTSC 2007), and state and federal laws.

1.4 *Forest Service Authority for Proposed Action*

State agencies use piscicide to remove nonnative fish populations and many treatments occur on National Forest System lands in the Northern Region (Region 1). The U.S. Forest Service is signatory to the *Cooperative Conservation Agreement for Yellowstone Cutthroat Trout within Montana* and the *MOU and Conservation Agreement for Westslope and Yellowstone Cutthroat Trout in Montana*, which demonstrates a commitment to restoring YCT populations. A central theme of these MOUs, the Fish and Wildlife Coordination Act (Public Law 85-624), and the Sikes Act (Public Law 93-452) is one of coordination among states and the Forest Service. In the spirit of these agreements and laws, pesticide application consistent with label requirements is considered a state action but is coordinated under the cooperation of the local National Forest and in some cases the Forest Service regional office.

Piscicide projects on National Forest System lands within designated wilderness must comply with the following applicable laws, regulations, policy, and Forest Plan direction.

Gallatin Forest Plan

Fish and Wildlife

The Forest will be managed to maintain and, where feasible, improve fish habitat capacity to achieve cooperative goals with Montana Fish, Wildlife and Parks and to comply with State water quality standards.

Management Indicator Species

Management Indicator Species (MIS) are those species whose habitat is most likely to be affected by management practices thereby serving as indicators of habitat quality. The Gallatin National Forest Plan directs that habitat is provided for identified management indicator species. Management indicator species present or potentially present within the project area include: Wild trout, grizzly bear, elk, bald eagle, northern goshawk, and pine marten.

Wilderness

The Forest Plan goal for managing the wilderness resource is "to maintain its wilderness character and to provide for its use and protection." The objective for meeting this goal states," Designated wilderness will be managed according to the Wilderness Act of 1964." The proposed project is within Forest Plan Management Area 4 which has the following applicable goals:

1. Manage existing wilderness in accordance with the Wilderness Act of 1964, Forest Service Manual direction, and site-specific direction.
3. Manage activities within grizzly bear habitat for the continued recovery of the grizzly bear.

Project activities will be designed specifically to comply with Forest Plan Appendix F1: Absaroka-Beartooth Wilderness Management Direction and to minimize disturbance to grizzly bears.

Forest Service Manual

The Forest Service Manual objective for management of fish and wildlife in wilderness (FSM 2323.31) states "protect fish indigenous to the area from human caused conditions that could lead to Federal listing as threatened or endangered." Furthermore, chemical treatment may be used to prepare waters for reestablishment of indigenous, threatened or endangered, or native species, or to correct undesirable conditions caused by human influence (FSM 2323.34f). Proposals for chemical treatments in wilderness are considered and may be authorized by the federal administering agency through application of the Minimum Requirements Decision Guide (MRDG) as outlined in Section E., General Policy (Association of Wildlife and Fish Agencies 2006). Any use of chemical treatments in wilderness requires prior approval by the Regional Forester (FSM 2150).

Endangered Species Act

Under Section 7 of the ESA, each federal agency must ensure that any action authorized, funded, or carried out is not likely to jeopardize the continued existence of any threatened or endangered species or critical habitat. A biological assessment (BA) will be completed for this project and submitted to the USFWS for formal consultation. Potentially affected threatened and endangered species and habitats include grizzly bear, Canada lynx, and Canada lynx critical habitat. There is expected to be no effect to the proposed threatened white bark pine as tree removal is not part of the proposed action and therefore was not further analyzed. The final Forest Service decision for piscicide use in the Absaroka Beartooth Wilderness would not be signed until concurrence is received from the USFWS.

National Forest Management Act

Sensitive fish and wildlife species on National Forest System Lands are managed under the authority of the National Forest Management Act (NFMA) and are administratively designated by the Regional Forester (FSM 2670.5; USFS 2004). The project area is included in Forest Service Region 1 on the Custer Gallatin National Forest. FSM 2670.22 requires the maintenance of viable populations of native and desired nonnative species and to avoid actions that may cause a species to become threatened or endangered. The NFMA directs the Forest Service to "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives." [16 U.S.C. 1604{g}{3}{B)]. Providing ecological conditions to support diversity of native plant and animal species in the project area satisfies the statutory requirements. The Forest Service's focus for meeting the requirements of NFMA and its implementing regulations is on assessing habitat to provide for a diversity of species.

FSM 2672.42 directs the Forest Service to conduct a biological evaluation (BE) to analyze impacts on sensitive species. If any unmitigated, significant effects are identified in the BE, the deciding officer must allow or disallow the impact. If significant effects would result in a trend toward federal listing, the deciding officer cannot allow the project to proceed. The analysis for sensitive aquatic species in this document is intended to inform the Forest Service decision whether to allow pesticide use and associated prohibited uses in the Absaroka-Beartooth Wilderness and meets the requirements for a BE as outlined in FSM 2672.42. A separate standalone BE for effects to sensitive terrestrial wildlife species is in preparation for this project. See Table 2 and Table 5 for lists of sensitive species.

Executive Order 12962 (June 1995)

Section 1. Federal Agencies shall, to the extent permitted by law and where practicable, and in cooperation with States and Tribes, improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities by:

b. identifying recreational fishing opportunities that are limited by water quality and habitat degradation and promoting restoration to support viable, healthy, and where feasible, self-sustaining recreational fisheries….

h. evaluating the effects of Federally funded, permitted, or authorized actions on aquatic systems and recreational fisheries and document those effects relative to the purpose of this order.

Executive Order 1386 (2001)

This order directs Federal agencies to take certain actions to further implement the Migratory Bird Treaty Act and promote the conservation of migratory bird populations. It requires agencies to avoid or minimize the adverse impact of their actions on migratory birds and ensure that environmental analyses under the National Environmental Policy Act evaluates the effects of proposed Federal actions on such species.

Wilderness Act of 1964

The Wilderness Act of 1964 states that certain uses such as motorized equipment and landing of aircraft are prohibited “except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act.” It is through this provision that ecological intervention in wilderness may be authorized to restore the natural quality of wilderness character.

Forest Service Decision

The U.S. Forest Service may use the analysis presented in this EA, in addition to the MRDG, to inform its decision whether to allow the proposed piscicide application and operation of motorized equipment in the Absaroka Beartooth Wilderness. The release of this EA commences a joint 30-day scoping period for MFWP and the Forest Service. The Forest Service will consider comment from this scoping period to help determine the appropriate level of documentation for its decision. Preliminary analysis indicates the effects of the piscicide rotenone and motorized equipment required for its application on National Forest System lands may fall within a category of actions listed in the Code of Federal Regulations (CFR) that is excluded from documentation in an Environmental Assessment (EA) or Environmental Impact Statement (EIS) and no extraordinary circumstances exist that would preclude the use of the following category 36 CFR 220.6(e)(6) “Timber stand and/or wildlife habitat improvement activities that do not include the use of herbicides or do not require more than 1 mile of low standard road construction.” If it is determined that the degree of potential effects of approving this authorization would result in the existence of extraordinary circumstances, further environmental analysis and documentation may be warranted.

If this joint environmental assessment is used to support the decision on NFS land, then this project is subject to the pre-decisional objection process described at 36 CFR 218, Subparts A and B. Only those who submit timely comments in response to this solicitation for public comment and meet the requirements contained in 36 CFR 218.25(a)(3) and (4) will have standing to object during the 45 day pre-decisional objection period. Comments submitted must meet the definition of “specific written comments” as defined at 36 CFR 218.2. Instructions for comment are provided on pages v and 75 of this EA.

1.5 *Estimated Commencement Date*

This project is proposed to begin mid-August with plans to be completed within or prior to the first week of September 2021. Treatment would follow at the same time frame in following years until all rainbow trout are removed unless wildfire or extreme weather result in the need to postpone treatment for a year or more. Follow up monitoring would include electrofishing and sampling for rainbow trout environmental DNA or eDNA, which is DNA present in water samples. Detection of rainbow trout or DNA would guide future actions and could result in a reduced spatial scope of treatment if monitoring shows treatment success varied across the watershed.

1.6 *Consultation*

FWP's piscicide policy (FWP 2017) requires consultation to address the potential cultural, historical, and ecological effects of the project. The project area is within the historical home of the Crow Tribe, and the tribe will receive a copy of this EA and request for input on the potential of the project to affect cultural resources.

The piscicide policy also requires consultation with the Montana Natural Heritage Program if an invertebrate species of concern has been observed in the project area. Their database does not have any observations of invertebrate species of concern; however, the western toad, a species of concern, relies on streams and wetlands for part of its life cycle. According to Bryce Maxell, a herpetologist and program manager for the Montana Natural Heritage Program, western toads would experience minor if any effects from this project. The effects of rotenone on amphibians is reviewed in detail in the subsection Amphibians. In short, western toads will have undergone metamorphosis by the time the project would be implemented and would not experience acute toxicity. Any tadpoles remaining would most probably not survive the winter. Dr. Maxell strongly preferred native Yellowstone cutthroat trout over rainbow trout, as the aquatic community did not coevolve with rainbow trout, which may exert a different predation pressure. As discussed previously, the U.S. Forest Service will consult with the U.S. Fish and Wildlife Service on ESA listed species.

2 Alternatives

2.1 *Alternatives Considered*

2.1.1 Alternative 1: Proposed Action

The proposed action would establish a secure population of Yellowstone cutthroat trout within the climate shield (Isaak et al. 2015; Isaak et al. 2017) and remove a source of rainbow trout genes that pose a threat to Yellowstone cutthroat trout throughout the Lamar River watershed. Rotenone is proposed for removal of fish. Rotenone is a naturally occurring substance derived from the roots of tropical plants in the pea family, such as jewel vine (Derris sp.) and lacepod (Lonchocarpus spp.). These plants are native to Australia, Oceania, southern Asia, and South and Central America. Native people have used rotenone for centuries to capture fish for food in areas where these plants are native. Rotenone has been used in fisheries management in North America since the 1930s (Finlayson et al. 2000).

Rotenone dissolved in water enters the fish through a thin layer of cells in the gills. This route of entry makes rotenone effective in killing fish at exceptionally low concentrations. Some aquatic invertebrates and gilled amphibians are sensitive to rotenone; however, timing of application and using the lowest effective concentration would minimize the toxicity of rotenone to these nontarget organisms (Finlayson et al. 2010; Vinson et al. 2010; Skorupski 2011). Mammals, birds, and other non-gill breathing organisms do not have this rapid absorption route into the bloodstream, and the concentration of rotenone used in fisheries management does not affect these animals. Rotenone kills fish by interrupting the Krebs cycle in individual cells. The Krebs cycle is the mechanism by which cells turn glucose, proteins, and fat into useable energy. Fish die because their cells are not capable of synthesizing chemicals that energize cells.

Rotenone found in the CFT Legumine product would be applied to streams in the Buffalo Creek watershed in diluted liquid and mixtures of sand, gelatin, and powder rotenone forms. Drip stations (Figure 5) are the primary mode of application for flowing water, and these release a thin stream of CFT Legumine solution mixed with stream water to achieve the target concentration. CFT Legumine would be applied following the label instructions.

Bioassays would be conducted on caged fish to determine the lowest dose that would meet the project objective of eradication of fish in the project area but minimize effects on nontarget organisms. FWP's piscicide policy requires bioassays to determine the lowest effective concentration (FWP 2017), and researchers recommend using the lowest effective dose to minimize mortality of nontarget organisms (Finlayson et al. 2010; Vinson et al. 2010; Skorupski 2011). Trout are more sensitive to rotenone than most invertebrates and using the lowest effective concentration is a measure to reduce mortality of nontarget organisms.

Figure 7. Drip station delivering thin stream of rotenone formulation mixed with stream water.

Treatment of fish-bearing waters in the Buffalo Creek watershed would take from one to several weeks each season to complete. Piscicide application begins in the headwaters and proceeds stepwise downstream. Pretreatment measurements of water travel time would determine distance between drip stations to ensure toxic concentrations of rotenone would be maintained throughout fish bearing streams.

Lakes in the watershed include Hidden Lake and small companion lake downstream, which is connected to Hidden Lake by a stream channel. Rotenone application in Hidden Lake would be accomplished either through aerial spraying or watercraft, depending on the amount of surface algae present. Typically, by late summer a thick hard algae crust (up to one foot thick) covers much of the lake surface. To achieve a complete fish-kill when the lake is algae covered, gasoline pumps mounted on inflatable watercraft would be used to disperse rotenone throughout the water column of Hidden Lake. Watercraft would be propelled by a gasoline motor is necessary to break paths through the thick algae.

Beaver dam complexes with approximately 26 acres of ponded water surface connection to streams increase the complexity of the area requiring treatment. These standing waters would be treated by applying diluted liquid rotenone through battery powered venturi systems from small oar-propelled watercraft and with small gasoline engine-powered trash pumps or sprayed on the water's surface from aircraft. Beaver dams could be temporarily breached to reduce the amount of water requiring treatment. Beavers would repair any disturbance to their dam within a few days. Off-channel ponds and wetlands would be treated with backpack sprayers, by air, or water pumps.

Rotenone would be deactivated near the confluence with Slough Creek (Figure 5) using potassium permanganate, a strong oxidizer. Untreated flows in the larger Slough Creek would further limit the potential for rotenone to affect fish outside of the project area. Potassium permanganate neutralizes rotenone within thirty minutes of contact time within the stream. The strategy for deactivation varies with size of the project area, presence of connected lakes, and the number of days treatment would take (FWP 2017). The project area would require multiple days of treatment. Deactivation would follow protocols for streams where travel time is greater than 8 hours from the lowermost point of application to the deactivation station. Deactivation at the barrier would following these steps:

Step 1: Place sentinel fish immediately upstream of the deactivation station and at 2-hour travel time intervals upstream

Step 2: Begin monitoring the 4-hour sentinel fish when the rotenone would theoretically arrive at that location based on contemporaneous flow measurements, and every 1 hour afterwards until the theoretical clearing time of rotenone has occurred.

Step 3: If any sentinel fish die or are stressed at any time at the 4-hour station start deactivation immediately.

Step 4: Apply potassium permanganate until the last of the rotenone has theoretically passed the deactivation station, which is calculated as the time of last application of rotenone plus travel time to reach the deactivation station. Stop only after all sentinel fish sentinel fish immediately upstream of the deactivation station survive an additional 4 hours without stress.

Hidden Lake is a nine-acre on-stream lake that flows into a 0.6-acre lake through a short channel. The outlet of the lower lake enters Buffalo Creek at river mile 14.8. FWP’s piscicide policy for deactivation for lakes with an outlet where the travel time to the deactivation station is greater than 8 hours from the lowermost point of application requires these steps:

Step 1: Sentinel fish must be placed immediately upstream and at 4 hours travel time upstream from the deactivation station.

Step 2: Begin monitoring the 4-hour sentinel fish when the rotenone would theoretically arrive at that location, and every 1 hour afterwards until the theoretical clearing time of rotenone has occurred.

Step 3: If all sentinel fish at the 4-hour station do not show signs of stress after an additional 8 hours of monitoring, then deactivation can be stopped.

Step 4: If any sentinel fish at the 4-hour station show signs of stress within 8 hours, deactivation must continue operating for a minimum of 24 hours, plus travel time, and stop after all sentinel fish immediately upstream of the deactivation station survive 4 hours without signs of stress.

Buffalo Creek is remote and in grizzly bear habitat, so handling and transporting dead fish would be impractical and unsafe. Dead fish would be left on-site to decay naturally, so their nutrients can contribute to recovery of invertebrate populations within the stream. Terrestrial scavengers contribute to the disappearance of carcasses, and piscicide-treated fish do not present health risks to organisms consuming them. Dead fish usually decay beyond recognition within 1-2 weeks. In the cold waters in the project area, most dead fish would sink, which would make them less detectable to humans. Although most fish would sink in Hidden Lake, wind and wave action could push some carcasses to the shoreline. These fish may be collected and sunk in the lake. Additional fish collection may take place at the downstream end of the treatment zone by Slough Creek campground in Yellowstone National Park.

Helicopter or a mix of helicopter and pack stock would be used to transport equipment, gear, and food to, within, and out of the project area. A helicopter is necessary to transport large metal cages, typically used for backcountry fire camps, to secure rotenone, garbage, and other attractants from grizzly bears. It is also safer to transport large equipment like boats, mixing tanks, and materials like rotenone and gasoline by helicopter than pack stock. Most personnel would access the project area by hiking or horseback. A helicopter may be used on a limited basis to transport personnel to remote headwater drip sites to prevent them from hiking back to camp after dark in grizzly bear country and on a limited basis may be used to move personnel into and out of the work area.

Monitoring is an important component of piscicide projects as it allows for evaluation of the effects of the project on aquatic invertebrates and fish, the organisms most likely to be affected by piscicide treatment (Meronek et al. 1996). FWP's piscicide policy requires pre-project planning to include review of the list of all aquatic and terrestrial species. This draft environmental assessment includes review of the potential for nontarget species with special status and the potential for proposed activities to affect these species in 2.1.5 Fish and Wildlife.

FWP's protocols for monitoring aquatic invertebrates includes pretreatment sampling and follows a decision tree to guide the level of sampling and consultation needed to protect invertebrate species of concern (FWP 2017). One year before treatment, planners must review Montana Natural Heritage Program's database (MNHP Animal Species of Concern) to evaluate the potential for invertebrate species of concern to be present in the project area. If no species of concern have been documented in the project area, samples would be collected before treatment at 3 locations in the treatment area and at one control site located outside the treatment area.

2.1.2 Alternative 2: No Action

Under this alternative the fishery in Buffalo Creek would not be removed. Rainbow trout would remain, and rainbow trout genes would remain a threat to Yellowstone cutthroat trout in Slough Creek and throughout the Lamar River watershed. Yellowstone cutthroat trout would not be planted in the project area.

2.1.3 Remove Rainbow Trout and Leave Fishless

This alternative would remove rainbow trout as described for the proposed action. The area would be left fishless, which was its historical state until rainbow trout were planted in Hidden Lake in 1932. This option would remove the threat posed by rainbow trout but eliminate angling in an area where visitors to the Absaroka-Beartooth Wilderness have been able to catch fish since 1935, which pre-dates the Wilderness Act of 1964 and establishment of the Absaroka-Beartooth Wilderness Area in 1978. Moreover, leaving the Buffalo Creek watershed fishless would fail to create a refugia for locally adapted, nonhybridized Yellowstone cutthroat trout that is secure from invasive species, disease, and climate change.

2.2 *Alternatives Considered but Dismissed*

2.2.1 Mechanical Removal of Rainbow Trout

Under this alternative, project partners would attempt to eradicate rainbow trout by removing fish captured using electrofishing. The large spatial extent of fish occupied waters and habitat complexity throughout these streams would make electrofishing an infeasible means of eradicating existing fish populations. The project area has considerable expanses of complex habitat, which would make mechanical removal in these reaches ineffective. A comparison of mechanical versus chemical removal with emphasis on projects in designated wilderness provides a detailed assessment of both approaches and confirms that mechanical removal would not be effective, would increase trammeling in wilderness, and would have negative consequences for streams and aquatic life (Endicott 2017) .

2.2.2 Angling

Angling is an inefficient means to eradicate fish from streams. Unlike piscicide, anglers cannot target young-of-the-year fish. Furthermore, many of the tributaries are steep, small streams with abundant deadfall timber that severely limits access to some streams. Insufficient numbers of anglers would fish these waters, given the difficulty in accessing them. Angling would not achieve the needed level of suppression of rainbow trout to protect Yellowstone cutthroat trout in the watershed below the project area.

3 Environmental Review

3.1 Physical Environment

3.1.1 Land Resources

LAND RESOURCES **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Soil instability or changes in geologic substructure?		X				
b. Disruption, displacement, erosion, compaction, moisture loss, or over-covering of soil which would reduce productivity or fertility?		X				
c. Destruction, covering or modification of any unique geologic or physical features?		X				
d. Changes in siltation, deposition or erosion patterns that may modify the channel of a river or stream or the bed or shore of a lake?		X				
e. Exposure of people or property to earthquakes, landslides, ground failure, or other natural hazard?		X				

3.1.2 Water

WATER **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Discharge into surface water or any alteration of surface water quality including but not limited to temperature, dissolved oxygen or turbidity?			X		YES	2a
b. Changes in drainage patterns or the rate and amount of surface runoff?		X				
c. Alteration of the course or magnitude of flood water or other flows?		X				
d. Changes in the amount of surface water in any water body or creation of a new water body?		X				
e. Exposure of people or property to water related hazards such as flooding?		X				
f. Changes in the quality of groundwater?		X				2f
g. Changes in the quantity of groundwater?		X				
h. Increase in risk of contamination of surface or groundwater?			X		YES	see 2af
i. Effects on any existing water right or reservation?		X				
j. Effects on other water users as a result of any alteration in surface or groundwater quality?	X	X	X			See 2j
k. Effects on other users as a result of any alteration in surface or groundwater quantity?		X				
l. Will the project affect a designated floodplain?		X				
m. Will the project result in any discharge that will affect federal or state water quality regulations?			X		YES	2m

Comment 2a: Alteration of Surface Water Quality

Proposed Action

The proposed project would intentionally introduce the pesticide CFT Legumine to surface water to remove nonnative rainbow trout. Release of CFT Legumine to surface waters would achieve concentrations within the label requirements. Bioassays conducted before treatment would determine the lowest effective concentration, which is a recommended practice to protect nontarget species (Vinson et al. 2010; Skorupski 2011). CFT Legumine would be applied by drip stations that release a thin stream of diluted product. The concentration in the stations will be calculated using streamflow data from the previous days. Fieldworkers with backpack sprayers would spray off-channel waters with potential to hold fish. Rotenone mixed with sand and gelatin would be placed at seeps to maintain toxic concentrations of rotenone during the treatment period. Aerial application may be required in some locations to achieve project objectives. Additional application methods may be used if deemed necessary to complete a successful treatment.

Several factors influence rotenone's persistence and toxicity. Warmer water promotes deactivation of rotenone, which has a half-life of 14 hours at 24 °C and 84 hours at 0 °C (Gilderhus et al. 1986; Gilderhus et al. 1988), meaning that half of the rotenone is deactivated and no longer toxic at that time. As temperature and sunlight increase, so does the rate of deactivation of rotenone. Bright sunlight in June deactivated 15 ppb rotenone in 10 cm of water to nontoxic concentrations in 2-3 hours (Brown 2010). Higher alkalinity (>170 mg/L) and pH (>9.0) also increases the rate of deactivation. Rotenone tends to bind to and react with organic molecules, and availability of organic matter substantially decreases the persistence of rotenone (Dawson et al. 1991). Dilution from groundwater upwelling or inflows from untreated tributary streams also contribute to the deactivation of rotenone.

FWP's piscicide policy (FWP 2017) requires deactivation of rotenone in streams and lake outflows using potassium permanganate, a strong oxidizer. Potassium permanganate would minimize exposure beyond the treatment area. Pretreatment monitoring would determine if contributions of groundwater increase flows to the point that additional potassium permanganate would be needed. Breaking down rotenone to a target and nontoxic concentration of 2 to 4 ppb requires continuously mixing the dry crystalline potassium permanganate with stream or lake water. Potassium permanganate deactivates rotenone within 15 to 30 minutes of mixing time with stream water. This reach of stream is the neutralization or deactivation zone. Full deactivation of rotenone requires delivery of potassium permanganate at a rate that maintains a residual concentration of potassium permanganate of 0.5-1.0 ppm after 30 minutes stream travel time. At this point, neither rotenone nor potassium permanganate would be present at toxic concentrations, and any residual would continue to degrade into nontoxic constituents.

In Buffalo Creek, deactivation would be expedited at the confluence with Slough Creek, as the larger volume of fresh water in Slough Creek would substantially dilute rotenone. Potassium permanganate added to deactivate rotenone would also be diluted, and potassium permanganate would be visible in Slough Creek for a short distance.

CFT Legumine is 5% rotenone, and the remaining constituents are inert ingredients used to dissolve and disperse the relatively insoluble rotenone. These inert ingredients do not include the organic solvents used in other formulations. The inert solvents and dispersants have the advantage of having low to no toxicity at the concentrations applied, and they break down rapidly in the environment (Fisher 2007). Many constituents are used in products approved for use products like toothpaste, sunscreen, and eye drops. The low concentrations, general lack of toxicity, and rapid breakdown of the inert ingredients in water does not pose a risk to health or violate water quality standards.

Monitoring the effectiveness of potassium permanganate in deactivating rotenone would occur at the downstream end of the deactivation zone. Maintenance of the target concentration of potassium permanganate of 0.5–1.0 ppm would be determined with a handheld chlorine meter. Caged fish placed at the downstream end of the deactivation zone would provide additional evidence of whether potassium permanganate was successful in deactivating rotenone. Survival of caged fish for 4 hours with no signs of stress indicates rotenone has broken down to nontoxic concentrations. Application of potassium permanganate would continue until the theoretical time, based on contemporaneous flow monitoring, in which all treated water would have passed the barrier, and caged fish placed immediately upstream of the deactivation zone survive for an additional 4 hours.

Dead fish would be present during and after this project. A relatively small proportion of dead fish would be noticeable, as sinking, rapid decomposition, and scavenging by wildlife would contribute to disappearance of killed fish. In lakes, most fish would likely sink. About 70% of fish in treated lakes in Washington did not surface (Bradbury 1986). Cooler water temperatures and greater depths inhibit surfacing of dead fish. In warm water ponds supporting members of the sunfish family, nearly all fish surfaced, except when temperatures were < 58 °F, when most fish sank and decomposed, and cool temperature and depth were attributable for the sinking of dead fish (Parker 1970).

Hidden Lake and its small, unnamed companion lake are at high elevation and likely considerably cooler than 58 °F, especially at the proposed treatment time, when nighttime air temperatures would further cool water temperatures. Therefore, a relatively small proportion of dead fish would be visible, and those fish would decompose and be eaten by scavengers. Decaying fish in rotenone-treated lakes can result in temporary nutrient enrichment and algal blooms. In Washington, 9 of 11 lakes treated with rotenone had an algal bloom shortly after treatment, and an estimated 70% of the phosphorus contributed from dead fish remained in the lake with decomposition of fish (Bradbury 1986). High elevation lakes tend to be nutrient-poor, so nutrients contributed from their decay stimulates phytoplankton production, which promotes rapid recovery of zooplankton and other invertebrates in treated lakes. Rotenone kills zooplankton, but biomass of zooplankton recovers rapidly following rotenone treatment

(Beal and Anderson 1993; Vinson et al. 2010). Algae take up the nutrients released by decaying fish, and zooplankton and other aquatic invertebrates feed on the algae. This rapid recovery of algae and invertebrates provide abundant food for when fish are returned to the lake.

No Action Alternative

The no action alternative would not have any effect on water quality.

Leave Fishless Alternative

Rotenone would have the same effects on surface water quality as the proposed action. Potassium permanganate would break down within 30 minutes or less of stream travel time. Freshwater from Slough Creek would greatly dilute both chemicals and expedite the deactivation of rotenone.

Comment 2f: Increase in Contamination of Groundwater

Proposed Action

No contamination of groundwater is anticipated from this project. Rotenone-treated water could go subsurface in losing reaches and lakes; however, rotenone binds to the bed sediments, soil, and gravel, and does not persist in groundwater (Engstrom-Heg 1971; Engstrom-Heg et al. 1978; Skaar 2001; Ware 2002). Rotenone moves only 1 inch in most soil types, except sandy soils, where it moves about 3 inches before binding to soils (Hisata 2002). In California, studies of wells in aquifers near to and downstream of rotenone application have never detected rotenone, or any of the organic compounds in formulated products (CDFG 1994). CFT Legumine does not contain the organic compounds used in other formulations of rotenone. The inert solvents and dispersants in CFT Legumine would not contaminate groundwater given their low toxicity and rapid breakdown.

Case studies in Montana have concluded that rotenone does not move measurably in groundwater (FWP unpublished data). At Tetrault Lake, neither rotenone nor inert ingredients were detected in a nearby domestic well, which was sampled 2 and 4 weeks after the lake was treated, despite being downgradient and within the same aquifer as the lake. FWP has sampled wells and groundwater in several piscicide projects that removed fish from ponds, and no rotenone or inert ingredients were detected in ponds ranging from 65 to 200 feet from treated waters. Likewise, rotenone applied to streams has not resulted in contamination of neighboring wells or groundwater. No rotenone was found in domestic and municipal wells adjacent to Soda Butte Creek during treatments in 2015/2016 which were drawing from the same unconfined alluvial-fill aquifer.

The project area is in designated wilderness and Yellowstone National Park. Review of the GWIC database found no wells within the project area. The considerable distance to the nearest well and inability of rotenone to move more than a few inches through soils indicates no wells would have potential to receive rotenone due to the proposed action.

No Action

Not implementing the proposed project would have no effect on groundwater.

Leaving Fishless Option

Under this option, the effects on groundwater would be the same as the proposed action.

Comment 2j: Effects on Other Water Users

Proposed Action

Rotenone has been used in organic gardening as a pesticide, so its presence in treated stream water has potential to kill nontarget invertebrates if applied to irrigated fields. The CFT Legumine label has specific requirements for use in streams or lakes used for irrigation that do not apply to treatment in the Buffalo Creek project area. Treated waters flow through designated wilderness and Yellowstone National Park, and no diversions for irrigation or domestic use are present. Therefore, precautions associated with irrigation waters would not apply to this project.

No Action

Not implementing the project would have no effect on other water users.

Leaving Fishless Option

This option would have the same effects as the proposed action.

Comment 2m: Relevance to State or Federal Water Quality Standards

Proposed Action

Montana DEQ issues a pesticide general permit on a five-year cycle to FWP that allow FWP to apply piscicides. FWP, and other piscicide applicators, must develop a pesticide discharge management plan as a condition for coverage under the permit. For FWP, the plan consists of procedures and protocols described in FWP's piscicide policy (FWP 2017), the American Fisheries Society's standing operating procedures for rotenone application (Finlayson et al. 2018), annual training, and critical review of projects by FWP's piscicide committee. The project area is within the Absaroka-Beartooth Wilderness, so a piscicide use permit from the U. S. Forest Service is required.

No Action

Under the no action alternative, no changes relating to state or federal water quality standards would occur and no permits would be necessary.

Leave Fishless Option

This option would have the same permitting requirements as the proposed action and would follow the established protocols for piscicide application (FWP 2017).

3.1.3 Air

AIR **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Emission of air pollutants or deterioration of ambient air quality? (also see 13 [c])			X			3a
b. Creation of objectionable odors?			X		yes	3b
c. Alteration of air movement, moisture, or temperature patterns or any change in climate, either locally or regionally?		X				
d. Adverse effects on vegetation, including crops, due to increased emissions of pollutants?		X				
e. Will the project result in any discharge which will conflict with federal or state air quality regulations?		X				

Comment 3a: Air Pollution

Proposed Action

Application of potassium permanganate at the detox station would require a generator to drive the auger. CFT Legumine would be mixed into Hidden Lake and its smaller companion lake using an outboard motor or sprayed from aircraft. The motors and generators create emissions; however, the odors, gases, and particulates would dissipate rapidly. CFT Legumine applied by air would settle and dissipate rapidly. Fieldworkers would be protected during the brief period of application through use of personal protective equipment. The effects of these emissions would be minor and short-term.

No Action

The no action alternative would not release pollutants to the air.

Leave Fishless Option

This option would have the same effect on air pollution as the proposed action.

Comment 3b: Objectionable Odors

Proposed Action

CFT Legumine does not use aromatic hydrocarbons as solvents or dispersants used in other formulations and does not have objectionable odors. It has a slight soapy smell that dissipates rapidly.

Exhaust from the motors driving the auger dispensing potassium permanganate at the detox station, boat motors, and helicopters along with mixing CFT Legumine at Hidden Lake could produce mild odors. These odors would be short-lived and dissipate rapidly.

Dead fish could cause objectionable odors, although several factors may limit the duration and intensity of the smell of decaying fish. Scavengers eat fish carcasses, and rotenone-killed fish do not pose a risk to animals scavenging them (see Comment 5c: Changes in the Abundance or Diversity of Nongame Species). The cold waters in treated streams and lakes during a late summer or early fall treatment period at this elevation would promote sinking of dead fish (Parker 1970), and the odor of the decay of sunken fish would not be detectable to humans. Dead fish would decay through microbial action and scavenging by invertebrates and vertebrates. Collection of dead fish by Slough Creek campground would occur during the project to prevent accumulation of fish carcasses that attract bears. Objectionable odors would be minor and last up to 2 weeks.

No Action

Not implementing the project would not create objectionable odors.

Leave Fishless Option

This option would result in the same conditions as described for the proposed action.

3.1.4 Vegetation

VEGETATION **Will the proposed action result in:**	**IMPACT** **Unknown**	**None**	**Minor**	**Potentially** **Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Changes in the diversity, productivity or abundance of plant species (including trees, shrubs, grass, crops, and aquatic plants)?			X			4a
b. Alteration of a plant community?		X				
c. Adverse effects on any unique, rare, threatened, or endangered species?			X			4c
d. Reduction in acreage or productivity of any agricultural land?		X				
e. Establishment or spread of noxious weeds?		X				
f. Will the project affect wetlands, or prime and unique farmland?		X				

Comment 4a: Changes in Vegetation

Proposed Action

The Buffalo Creek watershed arises in the Absaroka Mountains. Its headwaters originate near 10,000 feet above sea level and the downstream end of the project area is over 7,200 feet above sea level. Fish-bearing waters flow through high gradient, montane reaches surrounded by conifer forests and high elevation valleys with riparian areas of mixed species of shrubs and sedges. Beaver dam complexes form wet sedge meadows. Hidden Lake supports a large wetland, and valley walls near its outlet support an open coniferous forest.

Fieldworkers applying rotenone and conducting other components of the project would trample streamside and lakeside vegetation, which would be a minor and short-term disturbance. Ground cover, shrubs, and trees would be resilient to the brief period of field occupancy and the generally light use associated with rotenone projects. Most plants would be near or in dormancy during the treatment period, so they would be resilient to the short-term and minor trampling.

Horses and pack mules would also be present during field application of rotenone. Livestock would remain on established trails and held in designated animal holding areas within wilderness and Yellowstone National Park. Pack animals would graze and browse vegetation; however, the duration of the project and confinement of animals to trails and designated corrals would limit the spatial extent of their grazing and browsing.

Rotenone would not affect vegetation in the project area. Rotenone has a long history of use as a pesticide in agriculture and home gardening. Although it is no longer an approved pesticide for organic agriculture, its use on food crops without harming plants is consistent with its lack of toxicity to vegetation.

No Action

Under this alternative, no fieldworkers or livestock would be in the project area, so vegetation would not be trampled, grazed, or browsed beyond that which would happen from recreationalists unrelated to the project.

Leave Fishless Option

This option would have the same effect on vegetation as the proposed action.

Comment 4c: Effects on Plant Species of Concern

Proposed Action

The Montana Natural Heritage Program lists two plant species within the watershed as species of concern (Table 2). Whitebark pine is a candidate for inclusion for protection under the Endangered Species Act. Whitebark pine occupies subalpine forests and is a dominant species of tree line and krummholz habitats. Krummholz habitats are the wind-swept areas between tree line and alpine tundra, where harsh environments result in stunted, malformed trees. Climate change, pine beetles, and disease have resulted in major declines in whitebark pine across its range. The seeds are an important food source for grizzly bears. Piscicide application would not affect whitebark pine, as whitebark pine are an upland species and rarely associated with streams or lakes.

Table 2. Plant species of concern in the Buffalo Creek watershed.

Class	*Common Name*	*Scientific Name*	*State Status*	*USFS Status*	*USFWS Status*
Pinopsida	Whitebark pine	*Pinus albicaulus*	S3[1]	Candidate[2]	Candidate
Dicotyledoneae	Many-flowered viguerira	*Viguiera multifora*	S2S3[3]		

S3= Potentially at risk because of limited or potentially declining population numbers, range, even though it may be abundant in some areas
Candidate = Sufficient information on biological status and threats exists to propose to list as threated or endangered
S2S3 = Populations vary in status across Montana, with S2 populations being at risk because of very limited and/or potentially declining population numbers, range, and/or habitat, making it vulnerable to extirpation in the state. S3 populations are potentially at risk, even though they may be abundant in some areas.

The many-flowered viguiera is a perennial flower in the aster family. It occupies aspen woodlands and open slopes. The proposed project would not affect this flower, as it does not occupy stream-adjacent habitats where fieldworkers would have potential to trample or disturb the plant.

No Action

If the proposed action is not implemented these species would be unaffected.

Leave Fishless Option

Like the proposed action, this option would not have similar but shorter-term effects on vegetation, as fieldworkers would not return to the project area to reestablish a fishery.

3.1.5 Fish and Wildlife

FISH/WILDLIFE **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Deterioration of critical fish or wildlife habitat?		X				
b. Changes in the diversity or abundance of game animals or bird species?			X		Yes	5b
c. Changes in the diversity or abundance of nongame species?			X		Yes	5c
d. Introduction of new species into an area?			X			5d
e. Creation of a barrier to the migration or movement of animals?		X				
f. Adverse effects on any unique, rare, threatened, or endangered species?			X			5f
g. Increase in conditions that stress wildlife populations or limit abundance (including harassment, legal or illegal harvest or other human activity)?		X				5g
		X				
i. Will the project introduce or export any species not presently or historically occurring in the receiving location?			X			See 5d

Comment 5b: Changes in Diversity or Abundance of Game Species

Proposed Alternative

This goal of this project is to eliminate the rainbow trout currently occupying waters in the project area and replace them with nonhybridized Yellowstone cutthroat trout. Fish would be temporarily absent from the Buffalo Creek watershed, but Yellowstone cutthroat trout restocked in the streams and lake would recover within 5 years. The effects on the fishery would be short-term and minor, and return of nonhybridized Yellowstone cutthroat trout would mitigate for the short-term absence of fish.

Game species in the project area include white-tailed deer, mule deer, elk, mountain lions, black bears, ruffed grouse, and dusky grouse. The presence of fieldworkers in the project area would result in short-term and minor disturbance to these species. Presence of fieldworkers would be for several days in given treatment reaches for initial stream flow studies. Generally, 1 or 2 people operate a few drip stations and would travel to the stations established the week before. Rotenone treatment would last for several days per treatment reach. Treatment in subsequent years would be of the same intensity and duration unless monitoring results show areas to be free of fish. Wildlife would be displaced or tolerate presence of humans, depending on species. This disturbance would be short-term and minor.

No Action

No changes would occur in the diversity or abundance of game species.

Leave Fishless Option

This option would have the same effect on terrestrial game species as the proposed action. The project area would be devoid of game fish with removal of rainbow trout, and Yellowstone cutthroat trout would not be introduced to restore game fish.

Comment 5c: Changes in the Abundance or Diversity of Nongame Species

Proposed Action

Fish

Rotenone is highly toxic to fish, and the goal of the project is total eradication of fish within the project area. Rainbow trout are the only species present. The absence of fish would be short-term. The barrier waterfall likely blocked Yellowstone cutthroat trout and other members of the native fish assemblage. Often, Yellowstone cutthroat trout are the only species present in headwater streams within their native range. Yellowstone cutthroat trout are better adapted to the cold and relatively sterile conditions in the watershed than rainbow trout, and the project would likely result in greater numbers and larger sizes than the fishery currently provides.

Mammals

A diversity of mammals are present in the project area, and the project would result in short-term and minor disturbance associated with presence of fieldworkers. Mammals would also have short-term exposure to rotenone, with ingestion of treated water or fish and invertebrates killed by rotenone being the primary routes of exposure. See 2.1.2 Water for review of the research on low concentrations of applied rotenone and rapid breakdown of rotenone in the environment.

Wildlife have potential to be exposed through drinking treated water and scavenging rotenone-killed fish and invertebrates. Likely scavengers of dead fish and invertebrates include mink, grizzly bears, black bears, wolves, otters, birds such as ravens, magpies, bald eagles, and golden eagles. The exceptionally low concentrations of rotenone in treated water and its strong tendency to break down and become absorbed to organic matter means wildlife would not receive doses that would be harmful. Species that consume fish or invertebrates of aquatic origin would experience short-term reduction in food availability.

A substantial body of research has explored the acute and chronic toxicity of rotenone and other potential health effects, and exposure to the concentrations in water and dead animals is far lower than concentrations that would be toxic (EPA 2007). Rotenone breaks down rapidly in the digestive tract of mammals (AFS 2002), and potential exposure to rotenone from fish removal projects is far lower than levels shown to result in acute or chronic toxicity. The effective concentration of rotenone for fish removal projects in Montana ranges from 0.025 to 1.0 ppm, which is many times lower than concentrations found to be toxic. For example, a 22-pound dog would have to drink nearly 8,000 gallons of treated water or eat 660,000 pounds of rotenone-killed fish within 24 hours to receive a lethal dose (CDFG 1994). A half-pound mammal would need to eat 12.5 mg of pure rotenone, or drink 66 gallons of treated water within 24 hours to receive a lethal dose (Bradbury 1986).

Dead fish take up to 2 weeks to decay; however, this availability of dead fish would not result in exposure that would cause chronic toxicity, as rotenone has low toxicity when eaten and concentrations in fish tissue would be low and short-lived. In laboratory studies where rotenone was not subjected to environmental conditions that promote its breakdown, animals fed rotenone survived amounts that are far greater than is possible from fish removal treatments. Rats fed 75 ppm per day for over 2 years weighed significantly less than rats not fed rotenone and had smaller litters; however, this exposure did not result in mortality, birth defects, or cancer (Marking 1988). Likewise, dogs fed 200 mg of rotenone daily for 6 months weighed less than dogs not fed rotenone, ate less, and had diarrhea and mild anemia (Marking 1988). For rats and dogs, taste aversion was likely limiting their intake of food and contributing lower weights.

The dose and duration of exposures in these laboratory studies with rats and dogs (Marking 1988) were far greater than field exposure from drinking treated water or eating rotenone-killed fish or invertebrates. In trout streams in Montana, the effective concentration of rotenone is generally 0.025 to 0.5 mg/L, and application at each drip station lasts 4 to 6 hours. Streams would have concentrations toxic to fish and some invertebrates for up to 48 hours. Rotenone would take longer to break down in lakes, but the concentrations would be orders of magnitude lower than the amounts of rotenone fed to dogs and rats that resulted in minor health effects. Likewise, concentrations in dead fish and invertebrates would be minute and would quickly bind with the organic matter in the dead animal and be rendered nontoxic.

The contrast between the potential field exposure of mammals to the amounts and durations survived by rats and dogs is striking. In streams, rotenone concentrations would likely not exceed 50 ppb for 48 hours, and rotenone would remain in this toxic range in lakes for 2 weeks. Rats fed 75 mg of rotenone a day for 2 years and dogs fed about 200 mg/day for 6 months were not as healthy as animal eating lower doses or no rotenone, but the health effects were relatively minor. Rats and dogs survived and were able to reproduce despite daily exposure to exceptionally high concentrations of rotenone (Marking 1988). This high tolerance provides robust evidence that rotenone applied in fish eradication would not have measurable negative effects on terrestrial wildlife that drink treated water or eat dead fish or invertebrates.

Other toxicological studies provide evidence that the proposed project would not result in chronic health problems for wildlife drinking water or eating fish carcasses. Rotenone exposure has not been shown to result in birth defects (HRI 1982), gene mutations (VanGoetham et al. 1981; BRL 1982), or cancer (Marking 1988). Rats fed diets containing 10 to 1000 ppm of rotenone over 10 days did not experience reproductive dysfunction (Spencer and Sing 1982). T his combination of studies indicates rotenone application to eradicate fish poses no threat to wildlife drinking water or eating dead fish or invertebrates.

Eradication of fish and slight to moderate mortality of invertebrates from rotenone treatment would result in short-term and minor reductions in food availability for species that eat fish and invertebrates, with mink and otter being most reliant on an aquatic prey base. These species are highly mobile, so they would be displaced to other areas until the fishery recovered. Moreover, they eat a variety of organisms, and many prey species would not be affected by rotenone treatment. As discussed in Stream-Dwelling Aquatic Invertebrates, aquatic invertebrates recover in biomass within weeks, and invertebrates remain relatively abundant in streams following piscicide treatment, as not all taxa are vulnerable. Moreover, most of these predators can switch food sources, which would make them resilient to a short-term reduction of forage base.

Beaver dams are abundant in the project area (Scrafford et al. 2018), and these may be breached to reduce the amount of standing water to facilitate effectiveness of rotenone treatment. This disturbance would be short-term and minor. Beavers rapidly repair dams, and water levels would be restored within days after treatment.

Birds

Birds have potential to be exposed to rotenone through drinking treated water or scavenging dead fish and invertebrates. Like mammals, birds' digestive tracts rapidly break down rotenone. Furthermore, the concentration of rotenone in waters treated in fish removal projects is far lower than concentrations found to be harmful. A ¼-pound bird, which is smaller than an American crow, would have to drink 100 quarts of treated water or eat more than 40 pounds of rotenone-killed fish within 24 hours for a lethal dose (Finlayson et al. 2000).

Numerous species of bird rely on prey of aquatic origin, and rotenone has potential to temporarily decrease prey species. The goal is total eradication of rainbow trout, so streams and Hidden Lake would not have a food base for fish-eating birds until the population recovers, which typically takes 5 years. Fish-eating birds in the project are include kingfishers, bald eagles, osprey, and some waterfowl. These birds are mobile and can move to more productive feeding grounds until the fishery recovers. Restocking Hidden Lake as soon as rotenone degrades would provide fish for fish-eating birds.

Invertebrates would be slightly-to-moderately reduced in numbers, but recovery of invertebrate numbers and biomass is rapid (see Stream-Dwelling Aquatic Invertebrates). Timing the project for fall when migrating birds would be in reduced numbers would limit effects on most songbirds that consume adult mayflies, caddisflies, stoneflies, and midges. American dippers eat aquatic invertebrates and do not migrate. This species would have a short-term reduction in forage base. Rapid recovery of biomass, then diversity, would make this a minor and short-term reduction in forage for American dippers. Monitoring in Lower Deer Creek, a stream draining from the north flank of the Beartooth Mountains found American dippers to be abundant one year after piscicide treatment, and numerous newly fledged birds were present (FWP 2021).

Reptiles

Reptiles, especially garter snakes, have potential to be exposed to rotenone-treated water and are among the likely scavengers of dead fish and invertebrates. The low concentration of rotenone in the water and dead fish would not result in toxic exposure to reptiles. Like in mammals and birds, rotenone would break down rapidly in the digestive tract of reptiles. The reptilian gut may be more efficient at breaking down rotenone, as reptiles have capacity to digest bone, hair, and chitinous exoskeletons, all of which are far less degradable than the fragile rotenone molecule.

Amphibians

Amphibians are closely associated with water and have potential to be exposed to rotenone during piscicide treatment. Adult, air-breathing amphibians have low vulnerability to rotenone as applied at fish killing concentrations (Chandler and Marking 1982; Grisak et al. 2007; Billman et al. 2011; Billman et al. 2012), but gill-breathing larvae are vulnerable (Grisak et al. 2007; Billman et al. 2011; Billman et al. 2012). In the laboratory, tadpoles of Columbia spotted frogs and western toads died when exposed to 1.0 ppm of CFT Legumine for 96 hours (Billman et al. 2011). Rotenone killed nearly all Columbia spotted frog tadpoles in a lake in Yellowstone National Park within 24 hours; however, non-gill breathing metamorphs, juveniles and adults survived.

Despite near total mortality of Columbia spotted frog tadpoles during piscicide treatment in High Lake, in the Specimen Creek watershed in Yellowstone National Park, Columbia spotted frog tadpoles were nearly triple pretreatment abundance in the 3 years following piscicide treatment (Billman et al. 2012). The high tolerance of adults to rotenone, the presence of numerous adult age classes, their substantial reproductive potential, lack of fish, and abundance of habitat and forage likely contributed to increased numbers of tadpoles compared to the pretreatment baseline. In contrast, tadpoles returned to pretreatment numbers in fishless wetlands treated with rotenone in a similar watershed in southwest Montana for the 3 years after rotenone treatment (Billman et al. 2012). In the treated lake and wetlands, the effects of rotenone on Columbia spotted frog tadpoles were short-term and minor, as they returned to, or substantially exceeded, pretreatment numbers the following year and maintained those numbers for 3 years. Timing piscicide treatment after frogs have metamorphosed would be a protective measure; however, frogs have great resilience to this type of disturbance and would recover naturally and rapidly if rotenone had any immediate population level effects on tadpoles.

Investigation of the response of amphibians to rotenone projects in 10 alpine lakes in Montana found no significant differences between abundance and species composition of amphibians counted 2 to 4 years before rotenone application and following rotenone application (Fried et al. 2018). Species shared with the Buffalo Creek project include Columbia spotted frogs and western toads. Rocky Mountain tailed frogs, which retain gills for several years before metamorphosing, were resilient to rotenone treatments, as were long-toed salamanders. This general resilience to rotenone treatment across amphibian taxa suggests amphibians have a general ability to withstand rotenone projects when applied at the lowest effective concentration and after metamorphosis of most gilled species.

Although species and life stages of amphibian may vary in their tolerance to rotenone, research in Norway yielded comparable results to the field studies in Montana (Amekleiv et al. 2015), suggesting a general tolerance of rotenone by frogs and toads in the same genera as Columbia spotted frogs and western toads. The common frog (*Rana temoraria*) and common toad (*Bufo bufo*) were present pretreatment, and eggs, tadpoles, and adults were in the lake the next year, leading the authors to conclude CFT Legumine had little effect on the amphibians in the treated lake.

Hidden Lake, the smaller companion lake, and standing water in wetlands would be treated with rotenone. Research in nearby High Lake (Billman et al. 2012) allows inference on the potential response and recovery of amphibians in the Buffalo Creek watershed. High Lake lies 12 miles to the west of Hidden Lake and is nearly the same latitude. High Lake is about 1,000 feet higher in elevation than Hidden Lake, and this increase in elevation may be enough to make High Lake cooler, a factor that would slow down breakdown of rotenone and delay metamorphosis of amphibians. High Lake was treated in early August, whereas treatment in Hidden Lake would occur sometime in late summer through fall. Therefore, the likelihood that gill-respiring tadpoles would be present in standing waters in the Buffalo Creek watershed is much lower. The sustained resurgence of Columbia spotted frog tadpoles in High Lake indicates that even if mortality of Columbia spotted frogs occurred, they are resilient and would quickly repopulate lakes.

Wetlands with surface connectivity to lakes and streams in the Buffalo Creek would be treated with rotenone, and amphibians may be present. Adults would be resilient because of their mobility and relatively high tolerance to rotenone. If tadpoles are present during treatment, they would experience substantial to near total mortality. The population would be resilient; however, as adults would return to reproduce the following spring. In treated wetlands in southwestern at similar elevation, the number of tadpoles present in treated wetlands returned to pretreatment numbers and remained similarly abundant for three years posttreatment (Billman et al. 2012).

Timing piscicide treatment for late summer through fall, amphibian species present in the project area should be past metamorphosis. If gilled amphibians persist at this late date, they would likely not survive the winter (Bryce Maxell, MNHP, personal communication). Amphibians have adapted to life at cold, high elevations with resilience to loss of year classes. Many adults remain to repopulate following years when weather does not provide enough time or warmth for frogs to metamorphose or drought reduces water levels.

Amphibians with potential to be in the project area include boreal chorus frogs, Columbia spotted frogs, and western toads (Table 3). The proposed project timing, habitat use, and behavioral and anatomical adaptations would be protective of these species. Therefore, effects of rotenone application in the Buffalo Creek watershed on amphibians would be short-term and minor.

Boreal chorus frogs breed mostly in more ephemeral waters, and if they have not metamorphosed by the proposed timing of piscicide application, they likely would not be able to by that late date and would not survive the winter (Bryce Maxell, MNHP, personal communication). Adults may be present in wet areas treated with backpack sprayers; however, adult boreal chorus frogs would have low vulnerability to piscicide and be able to leave the project area.

Table 3. Amphibians likely to be in the Buffalo Creek watershed and their conservation status (MNHP 2018).

Common Name	Scientific Name	Gilled Phase Coincide with Proposed Treatment Timing?	Status
Boreal chorus frog	*Pseudacris maculata*	No	G5, S4
Columbia spotted frog	*Rana luteiventris*	Yes, at higher elevations	G4, S4
Western toad	*Anaxyrus boreas*	Yes	G4, S2, sensitive (USFS)

G5=Globally, the species is common, widespread, and abundant, although it may be rare in parts of its range. The species is not vulnerable in most of its range.
S4= In Montana, the species is apparently secure, although it may be rare in parts of its range, and/or expected to be declining.
G4 = Globally, is apparently secure, although it may be rare in parts of its range, and/or suspected to be declining.
S2 = At risk because of **very limited** and/or **potentially declining** population numbers, range and/or habitat, making it vulnerable to global extinction or extirpation in the state.
Sensitive = species for which population viability is a concern as evidenced by a downward trend in population or a significant downward trend in conservation concern designations on individual national forests.

Columbia spotted frogs likely use standing waters for breeding and are often near streams. Research on Columbia spotted frogs indicate they would be resilient to rotenone treatment, as no or few tadpoles would likely be present during early fall treatment, and the adults withstand rotenone at concentrations applied in fish removal projects (Grisak et al. 2007; Billman et al. 2011; Billman et al. 2012; Fried et al. 2018). Any tadpoles present during the proposed treatment period would be unlikely to survive the winter (Bryce Maxell, MNHP, personal communication). Tadpole production in treated lakes can be considerably higher following rotenone treatment compared to pretreatment (Billman et al. 2012). Columbia spotted frogs are a long-lived and can reach ages of 12 to 14. Having multiple age classes of frogs available to reproduce makes Columbia spotted frogs resilient to loss of a year class, and this species has evolved in harsh environments where periodic loss of year classes from extreme cold or drought occurs (Bryce Maxell, MNHP, personal communication). Piscicide treatment would mimic the types of environmental disturbance Columbia spotted frogs have evolved to withstand.

The MNHP has records of western toads near the project area. Western toads are a species of concern in Montana. Rotenone would be unlikely to harm adult western toads, as they are highly terrestrial as adults, and their impermeable skin protects toads from toxic chemicals. Moreover, adults would be prone to leave water if they encountered rotenone (Maxell and Hokit 1999).

Western toads will breed in streams, but in slower waters off the main channel. Western toads may also breed in wetlands and lakes in the project area. Laboratory investigations confirm the toxicity of rotenone to western toad tadpoles (Billman et al. 2011); however, the presence of numerous older age classes of terrestrial adults, and their high reproductive potential would counteract any mortality of tadpoles. Western toad populations were not decreased following rotenone treatment in 10 alpine lakes in western Montana (Fried et al. 2018). Female western toads in Montana have clutch sizes reaching 20,000 eggs (Maxell et al. 2003), and such large reproductive potential promotes rapid recovery.

Timing application of piscicide in late summer through early fall would be past the period of metamorphosis for western toads. If gilled forms were still present, they would be unlikely to survive the winter, so mortality associated with piscicide would not be additive (Bryce Maxell, MNHP, personal communication). Any effects of rotenone treatment on western toads would be minor and short-term.

Consultation with the senior zoologist at MNHP indicated benefits to amphibians with removal of nonnative fish (Bryce Maxell, MNHP, personal communication). Amphibians coevolved with native fish species, and their populations are likely to benefit from removal of nonnative fish. Nonnative rainbow trout are a potential cause of decline of native amphibians. He supported this project as being beneficial to native fish and amphibians.

Zooplankton

Rotenone has greater initial effects on abundance and diversity of zooplankton than stream-dwelling invertebrates, given the longer period of exposure and their permeable bodies (Vinson et al. 2010). Biomass of zooplankton recovers rapidly; however, zooplankton community composition can take from 1 week to 3 years to return to pretreatment conditions (Beal and Anderson 1993; Vinson et al. 2010). Like stream-dwelling invertebrates, zooplankton have life history strategies that aid in rapid recolonization following disturbance (Havel and Shurin 2004). Recovery of zooplankton varies among tax, with a dramatic bloom of early colonizers in the first few months (Beal and Anderson 1993). Other taxa take longer to recover, but the diversity and abundance can return as quickly as 6 months. The number and diversity of zooplankton increased in Devine Lake in the Bob Marshall Wilderness in Montana following a rotenone treatment (Rumsey et al. 1996). Densities of zooplankton in upper and lower Martin lakes nearly Olney, Montana were similar to pre-rotenone treatment two years after treatment (Schnee 1996). Although rotenone is toxic to zooplankton, field studies confirm the effects are short-term and minor, with populations rebounding first in biomass, then in diversity.

CFT Legumine is being used across continents in native fish conservation, and research in Norway demonstrated rapid recovery using concentrations and duration of CFT Legumine exposure in lakes like what is proposed for this project. In a Norwegian lake, zooplankton were sampled before application of CFT Legumine, immediately after treatment, and 1-year posttreatment (Amekleiv et al. 2015). CFT Legumine had an initial negative effect on zooplankton, with none detected immediately after treatment. The relative abundance of zooplankton changed from pretreatment to 1-year post treatment, with some species comprising a much higher proportion of the zooplankton community posttreatment. In addition, overall abundance of zooplankton increased considerably posttreatment. Rotenone removed common roach (*Rutilus rutilus*), a species of minnow that preys on zooplankton, which was attributed to the population boom of zooplankton.

Zooplankton have multiple ways to recolonize standing waters (Havel and Shurin 2004). Many zooplankton are capable of asexual reproduction, which favors rapid recolonization from existing eggs and zooplankton that survived treatment. Moreover, lakes have a long-term bank of dormant eggs. Wind, animals, and humans disperse dormant eggs from neighboring lakes. In Hidden Lake and its unnamed companion lake, zooplankton communities would likely follow the typical cycle of rapid recolonization of early colonizing species. The zooplankton community would recover in a few months to a few years. The rapid recovery of numbers would reset the food web and provide fertile waters for the return of fish.

As rotenone is toxic to zooplankton, plankton will be sampled before rotenone application and again one year after treatment has been completed. Hidden Lake would have a bank of dormant eggs to jumpstart recovery, and zooplankton would likely recolonize from influx of dormant eggs from neighboring lakes.

Stream-Dwelling Aquatic Invertebrates

Rotenone can result in temporary reduction of gilled aquatic invertebrates in streams, but they are resilient and recover rapidly. Invertebrates that are most sensitive to rotenone also tend to have short life-cycles, which results in the highest rates of recolonization (Cook and Moore 1969; Engstrom-Heg et al. 1978). Although gill-respiring invertebrates are a sensitive group, many are far less sensitive to rotenone than fish (Schnick 1974; Chandler and Marking 1982; Finlayson et al. 2010). Due to their short life cycles (Wallace and Anderson 1996), strong recolonization ability (Williams and Hynes 1976), and generally high reproductive potential (Wallace and Anderson 1996), aquatic invertebrates are capable of rapid recovery from disturbance (Boulton et al. 1992; Matthaei et al. 1996).

Fisheries managers are using CFT Legumine across continents in native fish conservation projects, and these efforts follow protocols equivalent to what is proposed for this project, which allows for generalizations among studies. Practices to limit mortality of nontarget organisms include using the lowest effective concentration to kill fish and limiting the duration of exposure. Consistently, studies of aquatic invertebrates in streams treated with CFT Legumine under current practice show the populations recover within a year (Skorupski 2011; Kjærstad et al. 2015; Bellingan et al. 2019). Mortality associated with rotenone application as proposed for this project is slight to moderate (Skorupski 2011), leaving a substantial proportion of invertebrates unharmed. These survivors reproduce and contribute to recovery of the community.

Treatment with rotenone mimics environmental stressors under which aquatic invertebrates evolved. Streams are prone to periodic disturbance such as floods, wildfire, and extreme drought, and these events can kill or displace invertebrates from reaches of stream. Aquatic invertebrates are adapted to periodic disturbance and have several mechanisms to recolonize depopulated reaches. Combined, these mechanisms result of rapid recovery of aquatic invertebrates affected by rotenone treatment or reduced by natural disturbance.

Aquatic invertebrates have a strong tendency to drift (Townsend and Hildrew 1976; Williams and Hynes 1976; Brittain and Eikeland 1988), which is transport of invertebrates by stream flow. Aquatic invertebrates are adapted to running waters, but they can be dislodged or they may actively drift to avoid predation or find new food patches (Brittain and Eikeland 1988). The importance of drift in dispersal of stream-dwelling invertebrates is an area of extensive study. Moreover, drift is what makes fly fishing with nymphs possible as a sport, as artificial nymphs mimic naturally drifting invertebrates.

Downstream drift of invertebrates is the major mechanism by which aquatic invertebrates recolonize streams and accounted for over 40% of invertebrates recolonizing experimentally depopulated reaches of stream (Williams and Hynes 1976). Fishless headwater reaches are not treated with rotenone, and these areas have tremendous capacity to contribute high diversity and large numbers of invertebrates (Wipfli and Gregovich 2002; Hollis 2018). The amount of energy contributed from aquatic and terrestrial invertebrates and detritus drifting from 1 kilometer (0.62 miles) of fishless headwaters could support 100-2000 young of the year salmonids (Wipfli and Gregovich 2002). The abundance of aquatic invertebrates drifting from fishless headwater reaches was enough to support 25% of the adult trout in fish-bearing waters (Hollis 2018). In Specimen Creek, which is about 12 miles west of Buffalo Creek, invertebrate drift was considerable, with 15.6 invertebrates drifting per cubic meter per second flow (Skorupski 2011). Although rate of drift varies with numerous factors (Brittain and Eikeland 1988), treated reaches of stream would receive a substantial, continuous supply of invertebrates from untreated headwaters, which would contribute to rapid recovery of invertebrate populations. The short-term reduction and absence of fish would also contribute to recovery of invertebrate populations providing a productive stream when fish are returned to treated streams.

Reproduction by aerial adults is the secondary mechanism aquatic invertebrates use to recolonize streams. Reproduction by winged adults accounted for 28% of invertebrates recolonizing experimentally depopulated reaches of stream (Williams and Hynes 1976). Having a winged adult state that flies upstream to reproduce or disperses from neighboring areas counteracts the constant passive or active drift of larval invertebrates and allows for repopulating reaches following disturbance.

Movement of invertebrates from deeper in the substrate and from downstream are other mechanisms of recolonization. Upstream movement of aquatic organisms is a relatively minor mechanism for recovery (Williams and Hynes 1976) and would likely not be a large contributor to recovery in streams with a downstream barrier. In contrast, invertebrates moving up from deeper in the streambed have better potential to contribute to recovery. Experimentally, this source contributed about 18% of invertebrates recolonizing a depopulated reach (Williams and Hynes 1976). Eggs, pupae, and larvae deeper in the streambed may be resistant to rotenone or not receive lethal concentrations of rotenone, especially in reaches with substantial groundwater contribution, which would dilute rotenone applied at the surface. In rotenone projects in Montana, impressive hatches of invertebrates have been observed the day after a stream was treated with rotenone indicating substantial numbers of invertebrates are present posttreatment to immediately jumpstart recovery.

Because piscicide has potential to alter abundance and species composition of aquatic invertebrates over the short-term, FWP piscicide policy requires pretreatment sampling of benthic aquatic invertebrates (FWP 2017). The timing and intensity of sample varies with the potential for the project to have adverse effects on invertebrate species of concern and the potential for controversy. Review of the MNHP's species of concern database did not yield records of invertebrate species of concern in the project area.

Review of the MNHP species of concern database and absence of benthic species of concern in samples collected in Buffalo Creek in 2019 place this project in the category 1 benthic invertebrate monitoring protocols (Table 4) (FWP 2017). Samples would be collected within a month before application of CFT Legumine in the treatment area and an untreated control in the same stream. Invertebrates would be identified to the lowest practical taxonomic level allowing for calculation of standard metrics of biological integrity such as number of taxa, number and percentages of mayflies, stoneflies, and caddisflies. Samples collected in August

2020 have not been analyzed but will contribute to evaluation of the response and recovery of aquatic invertebrates in the waters in the project area.

Table 4. Benthic macroinvertebrate sampling procedures and protocols for categories 1 and 2.

Category	*Sample Locations*	*Sample Dates*	*Sample gear, sample size*	*Metrics*
1	Control & treatment area (same stream)	• 1-year to 1-month pretreatment • 1-year posttreatment	Travelling kick net (1 sample in each of 3 sites in treatment area and 1 sample in control area)	• Taxa richness • EPT indices • CPUE Identify to lowest practical taxonomic level
2	Control, treatment area, deactivation zone (same stream)	• 1-year pretreatment and no more than 1-month pretreatment • At least 1-month posttreatment, pre-runoff the following spring, and 1-year posttreatment	Use DEQ's current sampling and analysis protocols, including 3 sites in treatment area, control area, and deactivation zone	• Taxa richness • EPT indices • CPUE • Functional feeding group metrics • Habit metrics • Composition metrics • Richness metrics Build a reference collection, have an independent taxonomist identify 10% subset for quality assurance, and identify to lowest practical taxonomic level

No Action

The no action alternative would maintain the existing condition as a nonnative rainbow trout fishery and allow the primary cause of loss of Yellowstone cutthroat trout to reside in a watershed with high conservation value for Yellowstone cutthroat trout. Yellowstone cutthroat trout would not receive the conservation benefit of 46 miles of secure habitat and a connected lake. Moreover, the Buffalo Creek watershed would be a perpetual source of rainbow trout genes, which jeopardizes the Yellowstone cutthroat trout in Slough Creek, which is the focus of mechanical removal efforts. Rainbow trout and hybrids have potential to invade other streams, further putting Yellowstone cutthroat trout at risk.

Invertebrates and amphibians would continue to live in waters with a species they did not coevolve with. Introduced fish may be functionally different predators on invertebrates (Benjamin et al. 2011; Lepori et al. 2012), which could alter the benthic assemblage and riparian-dwelling species. Stocking rainbow trout in fishless lakes has been detrimental to amphibians (Knapp and Matthews 2000), especially in the Sierra Nevada where frogs did not coevolve with nonnative fish. Amphibians present in the project area did coevolve with Yellowstone cutthroat trout and are present in fish-bearing waters throughout their range. Bryce Maxell, the state zoologist at MNHP, stated he had a strong preference for replacing rainbow trout with native Yellowstone cutthroat trout, as the native assemblage functions better. Leaving rainbow trout in the project area would not reflect the biological integrity or function of the coevolved assemblage of aquatic organisms.

Comment 5d: Introduction of a New Species to an Area

Proposed Action

The waterfall at the Yellowstone National Park boundary was likely a total barrier to upstream movement of fish, and these waters were likely fishless before introduction of rainbow trout. This project would expand the distribution of Yellowstone cutthroat trout within its historical range, but in historically unoccupied habitat. Under the conservation agreement for cutthroat trout (MCTSC 2007), establishing Yellowstone cutthroat trout in previously fishless waters is among conservation priorities when it would not have adverse effects on invertebrates or amphibians. Introduction of rainbow trout into the Buffalo Creek watershed was likely not beneficial to the coevolved assemblage of invertebrates and amphibians they encountered. All species likely to be present coevolved with Yellowstone cutthroat trout. As functionally different predators (Benjamin et al. 2011; Lepori et al. 2012), removal of nonnative rainbow trout would benefit the watershed's native invertebrates and amphibians.

No Action

By not implementing the project, nonnative rainbow trout would remain as a threat to Yellowstone cutthroat trout in the waters throughout the Lamar River drainage. Yellowstone cutthroat trout would not benefit from having secure habitat within a cold water refuge (Isaak et al. 2017). Invertebrates and amphibians would continue to face predation pressure they did not evolve with.

Leave Fishless Option

The consequences of this alternative would be the same as the proposed action with the exception that fish would not be restocked in the watershed. The lack of fish would eliminate a food source to mammals and birds that eat fish.

Comment 5f: Threatened and Endangered Species and Species of Concern

Proposed Action

Review of the MNHP's database on animal species of concern found several animal species of concern with potential to be in the project area. Information on distribution, migration, habitat use included here are from the field guide information in the MNHP's website (MNHP animal field guide), which includes citations.

Table 5. Animal species of concern within the project area (MNHP animal field guide).

Class	***Common Name***	***Scientific Name***	***State Status***	***Federal Status***
Bufonidae	Western toad	*Anaxyrus boreas*	S2	Sensitive
Anatidae	Harlequin duck	*Histrionicus histrionicus*	S2B	Sensitive
Strigidae	Great gray owl	*Strix nebulosa*	S3	
Picidae	Black-backed woodpecker	*Picoides arcticus*	S3	Sensitive
Accipitridae	Northern goshawk	*Accipiter gentilis*	S3	
Accipitridae	Golden eagle	*Aquila chrsaetos*	S3	
Accipitridae	Bald eagle	*Haliaeetus leucocephalis*		Sensitive
Falconidae	Peregrine falcon	*Falco peregrinus*	S3	Sensitive
Corvidae	Clark's nutcracker	*Nucifraga columbiana*	S3	
Fringillidae	Black rosy finch	*Leucostricte atrata*	S2	
Fringillidae	Cassin's finch	*Haemorhous cassinii*	S3	
Certhiidae	Brown creeper	*Certhia americana*	S3	
Turdidae	Veery	*Catharus fuscescens*	S3B	
Vespertilionidae	Townsend's big-eared bat	*Corynrhinus townsendii*	S3	Sensitive
Bovidae	Bison	*Bison bison*	S2	
Bovidae	Bighorn sheep	*Ovis canadensis*		Sensitive
Mustelidae	Wolverine	*Gulo gulo*	S3	Sensitive
Felidae	Canada lynx	*Lynx canadensis*	S3	Threatened
Canidae	Gray wolf	*Canis lupus*		Sensitive
Ursidae	Grizzly bear	*Ursos arctos*		Threatened

S2 = at risk because of very limited and/or potentially declining abundance, range, or habitat, making it vulnerable to extirpation in the state.
B=Breeding populations are potentially at risk because of limited and/or declining numbers, range and/or habitat, even though it may be abundant in some areas.
S3 =Potentially at risk because of limited and/or declining numbers, range and/or habitat, even though it may be abundant in some areas
areas.
Sensitive = population viability is a concern on Forest Service lands as evidenced by a significant downward trend in population or habitat capacity.

Threatened = listed as threatened under the Endangered Species Act

Western toads are likely present in the project area. See Amphibians for review of the literature on potential for rotenone projects to affect western toad. In summary, this project would have little effect on western toad, as the project would occur after metamorphosis, and western toads have tremendous reproductive capacity, which makes them resilient to short-term disturbance.

The MNHP database has records of several bird species of concern in the project area. Most bird species of concern inhabit terrestrial environments and rely on terrestrial food sources. Fieldworkers in the project area would result in short-term disturbance to these species, although some species are tolerant to presence of humans. Some may drink treated water; however, the exceptionally low toxicity in treated water, and the short duration rotenone remains toxic in the environment would not result in health risks to birds drinking water.

The project area may provide breeding habitat for harlequin duck. This species migrates to mountain streams in the Intermountain West from the Pacific Coast for breeding. Breeding birds arrive in late April to early May, and males leave in June. Females and young depart from late July to early September. Ducklings would be fledged and close to out-migrating during the proposed project period if they had not already left. Fieldworkers would be a short-term disturbance to harlequin ducks if still present. Rotenone could increase the availability of invertebrates through drift of killed invertebrates. Exposure to rotenone through eating invertebrates or drinking water would not present a health risk. These factors would result in short-term and minor disturbance to harlequin ducks and the possible benefit of greater accessibility of rotenone-killed invertebrates.

Golden and bald eagles have potential to scavenge dead fish; however, the low concentration of rotenone in fish tissues, and its rapid breakdown in the environment would not present a health risk to eagles.

Townsend's big-eared bat has potential to be in the project area and is a year-round Montana resident. This species roosts and hibernates in caves or old mines in forested areas. Townsend's big-eared bats eat nocturnal flying insects near foliage of trees and shrubs and specialize on small moths, but also feeds on other flying insects of mostly terrestrial origin. Timing the project for fall would coincide with the natural reduction of emergence of aquatic insects. The Townsend's big-eared bat's preference for invertebrates of terrestrial origin, potential for individuals to be hibernating at this elevation during project area, and relatively small reduction of emergent invertebrates from aquatic origin would result in short-term and minor effects on Townsend's big-eared bats at most.

Bison are present in grasslands in Yellowstone National Park and adjacent lands, often at high elevation and have potential to be present in the project area during the proposed treatment. Fieldworkers have potential to temporarily disturb bison during the project implementation, but this would be short-term and minor. Rotenone would not pose a risk to bison drinking rotenone-treated waters. Bison would experience short-term and minor disturbance from this project.

The project area is within habitat likely to be occupied by wolverines. This species has been proposed for inclusion for protection under the endangered species list, and the State of Montana considers it an S3 species that is potentially at risk due to limited or declining numbers, range, or habitat. Wolverines live in alpine tundra, and boreal and mountain coniferous forests. Wolverines are mobile within large home ranges. The presence of fieldworkers may displace them temporarily from a small portion of their home range. Wolverines are opportunistic in their food habits and could eat rotenone-killed fish or drink rotenone-treated water; however, as discussed in Mammals, the low concentrations and short duration of rotenone in the environment would not pose a health concern to wolverines. This project would have minor and short-term disturbance to wolverines, as they would be resilient to human activities in a small portion of their home range for the duration of the project.

The MNHP has two observations of Canada lynx in or near the project watershed from over 20 years ago (MNHP 2018); however, there are few recent or verified observations in this part of the Greater Yellowstone Ecosystem, and no compelling evidence that the area historically or recently supported a resident, breeding lynx population (USFWS 2017). Lynx presence in the proposed project area is likely ephemeral or intermittent and related to occasional dispersing or transient lynx. If present, lynx would stick to Engelmann spruce-subalpine fir communities and remain in or close to dense forest cover and avoid forest openings and meadows. Canada lynx are specialists and prey mostly on snowshoe hare but will switch to red squirrels or grouse when hare populations are limited (USFWS 2017). The project would have a slight potential to displace the rare, dispersing Canada lynx in the project area. If present during treatment, a Canada lynx could be exposed to rotenone treated water; however, the exposure would be of too short a duration and concentration to cause a health risk. Canada lynx would be unlikely to scavenge dead fish. Canada lynx would be most sensitive to large-scale changes in terrestrial habitat, which would not occur with this proposed action. The combination of rarity of Canada lynx in the project area, their habitat and food preferences, and short duration of project would result in negligible effects on Canada lynx.

Grizzly bears are present in the project area and seen with relative frequency (MNHP 2018). Project activities including aircraft operation and rotenone application by fieldworkers would have potential to disturb or temporarily displace grizzly bears, and conflict between bears and humans would be possible. The proposed action contains mitigation measures to minimize disturbance to grizzly bears. These include:

- Project implementation would proceed from the Buffalo Creek headwaters downstream with rotenone application activities being restricted to a subset of proximal drainages for each operational period.
- Adherence of aircraft to predetermined flight lines approved by the USFWS.
- All attractants including rotenone, food, and garbage would be secured throughout the duration of the project either in bear-proof containers or behind electric fences.

Fieldworkers would be trained in bear country safety practices, such as safe food storage, making noise, and they would carry bear spray. Handling, transporting, and storing dead fish would increase the risk of conflicts with grizzly bears in the remote project area, so fish would be left to decay with the exception for the area around Slough Creek campground. Grizzly bears do not rely on fish at this elevation; however, they would opportunistically scavenge fish carcasses. They would also have potential to be exposed to rotenone-treated water; however, the low concentration and short duration of exposure of rotenone through eating dead fish or drinking treated water would not pose a health risk to grizzly bears. In summary, the short-term presence of fieldworkers and dead fish have potential to result in conflicts with grizzly bears but following bear safety practices would decrease potential for conflicts that would be detrimental to humans or bears.

The project would be beneficial to Yellowstone cutthroat trout, a species of concern that is currently not in the project area. This project would provide substantial habitat within an area predicted to remain suitable for Yellowstone cutthroat trout despite the warming climate. This project would eliminate a source of rainbow trout to Slough Creek and the greater Lamar River watershed. Being in the headwaters of Yellowstone National Park, the Yellowstone cutthroat trout have tremendous ecological and recreational value and are a key component of the natural heritage of America's first national park.

Preliminary analysis indicates effects of the proposed action would not result in a trend toward federal listing or loss of population viability for any potentially affected species within the analysis area (personal communication Lenora Dombro Custer Gallatin National Forest Wildlife Biologist). The Custer Gallatin National Forest will submit a Biological Assessment to the Fish and Wildlife Service and initiate Section 7 consultation based on the selected action for effects to Canada lynx, lynx critical habitat, grizzly bear, and whitebark pine.

No Action

Not implementing the project would have no effect on most of the species of concern in the area, except for western toad and Yellowstone cutthroat trout. Rainbow trout may continue to exert predation pressure on western toads that they did not evolve with.

Leave Fishless Option

This option would have the same effects on species of concern as the proposed action for the duration of the treatment. Fish would not be available to mammals and birds that eat fish. Yellowstone cutthroat trout would not benefit from expansion into secure habitat within a climate shield.

Comment 5g: Increase Stress on Wildlife

Proposed Action

Presence of aircraft and fieldworkers would result in short-term disturbance to wildlife and may temporarily displace animals from occupied habitat. Large mammals would have the greatest potential to be disturbed by presence of humans. This disturbance would be short-term and minor disturbance. Conservation and monitoring often brings fieldworkers and firefighters into remote wilderness, and this project would be similar to other common practices.

No Action

Wildlife would not experience increased stress if the project is not implemented.

Leave Fishless Option

This option would result in the same potential for stress on wildlife as the proposed action.

Comment 5i: Introduction of Species Not Presently or Historically Present in the Project Area

Proposed Action

The project area was likely historically fishless, with the barrier falls preventing native Yellowstone cutthroat trout from colonizing these waters from downstream. Fish planted in the watershed would come from the best available source following guidance developed to select brood stock for translocation that considers genetics, fish health, and potential effects on donor populations (Shepard et al. 2018).

This project would result in an expansion of occupied habitat within the Yellowstone cutthroat trout's historical range. The conservation agreement for Yellowstone cutthroat trout considers these projects among high priority conservation approaches if introduction does not have a negative effect on species present (MCTSC 2007). Species present in the area coevolved with Yellowstone cutthroat trout elsewhere in their historical ranges. Any special condition associated with the fishless state is unknown and was lost with introduction of rainbow trout. The native assemblage of invertebrates and amphibians present in the project area would likely benefit from the removal of rainbow trout and introduction of Yellowstone cutthroat trout. Nonnative fish are functionally different predators (Benjamin et al. 2011; Lepori et al.

2012), so their elimination would be beneficial. This project would result in the establishment of a coevolved community of fish, invertebrates, and amphibians within the climate shield, which would bring considerable conservation benefit over its existing state.

No Action

Not removing rainbow trout and replacing them with native Yellowstone cutthroat trout in the historically fishless waters would allow rainbow trout to continue to threaten native Yellowstone cutthroat trout in receiving streams. Yellowstone cutthroat trout would not have expanded distribution into secure and thermally suitable habitat.

Leave Fishless Option

The leave fishless option would not result in establishing a secure population of Yellowstone cutthroat trout within the climate shield, which would result in a lost opportunity to establish a secure population of Yellowstone cutthroat trout. The threats Yellowstone cutthroat trout are complex and real, and not establishing a population within this secured area is contrary to FWP and USFS obligations (MCTSC 2007; Endicott et al. 2013).

3.2 Designated Wilderness

Proposed Action

The proposed action would result in activity in the Absaroka Beartooth Wilderness. The Absaroka Beartooth Wilderness is managed to maintain "wilderness character," including opportunities for solitude or a primitive and unconfined type of recreation, making "the imprint of man's works less noticeable," protecting indigenous species, and allowing natural processes to regulate ecosystems. Modern civilization and human control that affect ecological systems and processes can compromise wilderness character.

The Minimum Requirements Decision Guide (in preparation) evaluates the effects of each alternative on the five qualities of wilderness character. These include "untrammeled", "undeveloped", "natural", and "solitude or primitive and unconfined recreation." It also determines whether the proposed activities would accomplish project objectives with the least intrusion to wilderness values.

The proposed action has the potential for minor, short-term effects on wilderness character. Proposed activities including helicopter mobilization of equipment and materials to the project area, rotenone application using motorized equipment, and notching beaver dams all present potential short-term negative effects on the Absaroka Beartooth Wilderness Area and wilderness values.

Fish removal using the piscicide rotenone is the only effective, practical alternative for meeting the project objective of complete removal of rainbow trout in all connected waters of Buffalo Creek, with the least potential alteration of wilderness values. Completing this project improves the natural quality of wilderness character in the long-term by restoring a species native to the geographic area. In doing so it meets the primary objective of conserving the genetic purity of one of the most important Yellowstone cutthroat populations in the species' range. Therefore, the proposed action meets the objectives for fish and wildlife management in FSM 2323.3 by helping to conserve a native species that has a potential for future listing under ESA. The short-term alterations of the untrammeled and natural qualities of wilderness character relating to chemical piscicide are balanced by the improved long-term natural conditions of wilderness character through restoration of a native species.

No Action

Under the no-action alternative, the presence of rainbow trout would continue to degrade the naturalness quality of wilderness character. Failure to eradicate the source population of rainbow trout hybridization to the Lamar River system could ultimately result in the extinction of one of the most important Yellowstone cutthroat trout populations in the species range.

Leave Fishless Option

Under this alternative there would be potential for minor, short-term effects on wilderness character. Proposed activities including helicopter mobilization of equipment and materials to the project area, rotenone application using motorized equipment, and notching beaver dams all present potential short-term negative effects on the Absaroka Beartooth Wilderness Area and wilderness values.

The naturalness quality of wilderness character would be improved by returning the upper watershed of Buffalo Creek to its historically fishless condition. However, leaving the watershed fishless would eliminate an opportunity for solitude or primitive and unconfined recreation. A fishery was established in Buffalo Creek 43 years before the designation of the Absaroka Beartooth Wilderness. This fishery contributes to the enjoyment of recreationists and supports the livelihood of guides and outfitters permitted by the Forest Service to operate in the Buffalo Creek drainage.

Finally, leaving the Buffalo Creek drainage fishless in the Absaroka-Beartooth Wilderness would eliminate the establishment of a genetically pure Yellowstone cutthroat trout population in the Yellowstone headwaters watershed secure from hybridization, invasive species, disease, and warming climate effects.

3.3 Human Environment

3.3.1 Noise and Electrical Effects

6. NOISE/ELECTRICAL EFFECTS Will the proposed action result in:	Impact Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Increases in existing noise levels?			X			6a
b. Exposure of people to serve or nuisance noise levels?		X				
c. Creation of electrostatic or electromagnetic effects that could be detrimental to human health or property?		X				
d. Interference with radio or television reception and operation?		X				

Comment 6a: Increases in Existing Noise Levels

This project would bring short-term increases in noise from several sources. The increased presence of humans would result in increased noise from talking, walking through the forest, and making their presence known as part of bear safety. Equipment needed for delivery of piscicide to the site and into surface waters would also increase noise. Helicopters would be required to transport materials with an estimated 22 landings over 4 days. Additionally, use of helicopters on a limited basis to transport personnel to remote headwater drip sites would result in up to three more days of increased noise. Mixing CFT Legumine into lakes in the project area would require a gas motor, which would run for up to several days. Rotenone would be applied to the 26 acres of ponded water in wet meadows via aerial spraying over two days or by gasoline powered trash pumps over a duration of up to 6 days.

Comment 6b: Expose People to Nuisance Noise

Proposed Action

Helicopters, boat motors, and the power augers would result in noise that would be reasonably considered a nuisance, especially within designated wilderness. The noise would be of short duration. Noise from helicopters would be the most apparent and travel the farthest. Noise from the boat motor would last up to several days during each treatment. The generator driving the power auger applying potassium permanganate would be running for up to two weeks. The generator and auger will be located upstream from the confluence with Slough Creek and be inaccessible to visitors. Noise from the generator and boat motor would not travel far.

No Action

Not implementing the project would not expose people to noise that would be perceived as a nuisance.

Leave Fishless

Under this alternative, noise effects would be like the fish removal portions of the proposed action, although subsequent disturbance associated with reestablishing a fishery would not occur.

3.3.2 Land Use

7. **LAND USE** Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Alteration of or interference with the productivity or profitability of the existing land use of an area?		X				
b. Conflict with a designated natural area or area of unusual scientific or educational importance?			X			7b
c. Conflict with any existing land use whose presence would constrain or potentially prohibit the proposed action?	X					7c
d. Adverse effects on or relocation of residences?		X				

Proposed Action

Comment 7b: Conflict with Designated Natural Area

The proposed project area is within the Absaroka-Beartooth Wilderness Area and ends within the deactivation zone in a short distance of Slough Creek, which is in Yellowstone National Park. The project would result in presence of field crews, their camps, and horses and helicopters to transport materials. This disturbance would be short-lived lasting. Press releases and placing signs near stream access points would alert the public to the project. Actions would be limited to the Buffalo Creek watershed, leaving the majority of the Absaroka-Beartooth Wilderness and northern extent of Yellowstone National Park undisturbed.

No Action

Not implementing the project would result in no conflict with designated natural areas.

Leave Fishless Option

This option would have a lasting effect on land use with permanent removal of fish. Visitors to the Buffalo Creek watershed have had 90 years of fishing opportunity from a fish plant in the

1930s. This date of fish introduction predates the Wilderness Act of 1964 and the designation of the Absaroka-Beartooth Wilderness in 1978. Fishing is popular in Hidden Lake, which has an outfitter's camp nearby, which likely increases use beyond what is predicted under the available angling pressure data maintained by FWP.

Comment 7c: Conflict with Existing Land Use

Proposed Action

Recreation is the primary land use in the project area, and the proposed project would have potential to result in short-term disruption of land uses. The presence of fieldworkers could alter some visitors' enjoyment of the Absaroka-Beartooth Wilderness and adjacent Yellowstone National Park. This alteration would be short-term.

Waters in the project area would be temporarily closed to access while rotenone was active in the water. The CFT Legumine label requires restriction of recreational activities including wading, swimming, boating, and fishing while rotenone is being applied, so treated waters would be closed to public access until rotenone has been deactivated, either naturally or through application of potassium permanganate. Streams would be closed for a minimum of 72 hours. Lakes would be closed until caged fish survived 24 hours within the treated lake or up to 14 days. Signs would be posted at trailheads and access points advising visitors to the closures. Press releases and work with partners would alert backcountry users as to the nature and duration of the project and describe closures.

The proposed timing for the project coincides with part of the general archery season and upland game bird hunting season. Project activity along the stream may displace game species, although this disturbance would be short-term and minor.

A goal of the project is complete eradication of rainbow trout currently occupying the project area, so recreational fishing would be suspended until recovery of the transplanted Yellowstone cutthroat trout. No data on angling use of Buffalo Creek and Hidden Lake are available. Although angler days cannot be quantified, the outfitter's camp near Hidden Lake and easy access to Buffalo Creek for those hiking or on horseback gives anglers opportunities to fish the lake and stream. Stocking the lake with catchable Yellowstone cutthroat trout soon after rotenone treatment would mitigate for loss of fish in the lake. The quality of the fishing would likely improve with a locally evolved species.

Replacing the existing rainbow trout fishery with locally adapted Yellowstone cutthroat trout would mitigate for the short-term absence of fish in Buffalo Creek and Hidden Lake. Yellowstone cutthroat trout are the trout native to this part of the Greater Yellowstone

Ecosystem and are a key component of its biological heritage. Visitors to the Absaroka-Wilderness would have the rare opportunity to catch native Yellowstone cutthroat trout in a spectacular setting. Moreover, this project would protect the Yellowstone cutthroat trout in Slough Creek and the larger Lamar River watershed by removing this source of genetic contamination. The short-term lack of fishing opportunity would bring tremendous conservation and recreational value over the long-term.

No Action

Not implementing the project would result in no changes to existing land uses.

Leave Fishless Option

As the project area is within designated wilderness and Yellowstone National Park recreation is the land use with potential to be affected. The leave fishless option would have the same consequences as the proposed action in terms of disruption and closures during the piscicide application. Fishing is an existing land use in the Buffalo Creek watershed and leaving the waters fishless would eliminate this land use.

3.3.3 Health Risks and Health Hazards

8. RISK/HEALTH HAZARDS Will the proposed action result in:	Impact Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Risk of an explosion or release of hazardous substances (including, but not limited to oil, pesticides, chemicals, or radiation) in the event of an accident or other forms of disruption?			X		YES	8a
b. Affect an existing emergency response or emergency evacuation plan or create a need for a new plan?			X		YES	8b
c. Creation of any human health hazard or potential hazard?			X		YES	see 8ac
d. Will any chemical toxicants be used?			X		YES	see 8a

Comment 8a: Risk of Explosion or Release of Hazardous Substances

Proposed Action

The project would entail transporting and handling drums of CFT Legumine and potassium permanganate into the project area. This project would have at least two licensed applicators, who would handle undiluted CFT Legumine and potassium permanganate, and these applicators would bear the primary risk of exposure to hazardous materials. FWP piscicide policy requires one applicator to be independent to serve ensure safety and quality control measures are met (FWP 2017). Applicators require a license issued by the Montana

Department of Agriculture and attend weeklong trainings in preparation for the licensing examinations. FWP and partnering agency applicators have many years of experience in implementing rotenone projects.

Applicators would follow the label instructions on safe handling and use of personal protective equipment for CFT Legumine and potassium permanganate. Applicators would supply fieldworkers with diluted CFT Legumine to be dispensed at drip stations, and fieldworkers would wear personal protective equipment when handling dilute product or when in contact with treated waters. Transporting, handling, storing, and applying chemicals according to label specifications would reduce the probability of hazardous exposure or chemical spill.

No Action

Not implementing the action would result in no risk of explosion or release of hazardous substances.

Leave Fishless Option

This option would result in the same risks are the preferred alternative and would require the same safety practices and use of personal protective equipment.

Comment 8b: Emergency Response Planning

Proposed Action

FWP piscicide policy requires a treatment plan be developed for rotenone projects (FWP 2017). The treatment plan provides the basis for ensuring effective chemical application while protecting health and safety and preventing accidents and spills. The treatment plan lays out a clear chain of command, requirements for training, and delegation of roles and responsibilities. Safety measures include a spill contingency plan, provisions for first aid, and requirements for personal protective equipment. Implementing projects in remote areas requires establishing clear lines of communication among members and ability to communicate with emergency responders. Fieldworkers will maintain communication with handheld radios and will be trained in their use. The plan includes provisions for monitoring and quality control. Implementing this project should not affect existing emergency plans. FWP's implementation plan provides internal risk management and safety provisions to minimize the need of requiring an outside emergency response, so any effects on existing emergency responders would be short-term and minor.

No Action

No emergency response planning would be required if the project is not be implemented.

Leave Fishless Option

This option would require the same emergency response training as the proposed action. As fieldworkers would not be returning to reintroduce fish, the extended risks associated with back country work would not apply.

Comment 8c: Creation of Hazards to Human Health

Proposed Action

This project would result in release of CFT Legumine, a formulation of rotenone, into waters in the project area, and release of potassium permanganate at upstream of the confluence of Buffalo Creek and Slough Creek. The combination of oxidation with potassium permanganate and dilution from untreated flows in Slough Creek would render rotenone nontoxic quickly. Analysis of risks to human health from exposure to CFT Legumine follows information provided by the EPA (EPA 2007) and a study of the toxicity and persistence of the active and inert ingredients in CFT Legumine (Fisher 2007).

Toxicity evaluations examine acute and chronic toxicity. Acute toxicity is the adverse effect of a highly toxic substance from a single exposure or multiple exposures in a short space of time that result in substantial health risks. Rotenone ranks as having high acute toxicity through oral and inhalation routes of exposure, and low acute toxicity through exposure to skin (EPA 2007).

Several factors would be protective of the health of workers handling CFT Legumine and prevent harmful exposure to rotenone. The low concentration of rotenone in CFT Legumine is one factor. It comprises 5% of the formulation, or 5 g/L. No one would be handling pure rotenone. Furthermore, the label for CFT Legumine requires applicators to wear a dust/mist respirator, splash safety goggles, impervious gloves, and coveralls. The personal protective equipment would prevent inhalation, ingestion, and dermal exposure. Goggles would protect eyes from contact with CFT Legumine.

Applicators would supply bottles of CFT Legumine to fieldworkers responsible for operating a given drip station or backpack sprayer. Flow measurements taken the day before would determine the amount of CFT Legumine in dispensed bottles required to achieve the target concentrations of rotenone in streams, usually 25 to 50 ppb. The CFT Legumine would be mixed with stream water in drip station cubes or backpack sprayers. Operators handling CFT Legumine would also wear eye protection, a protective mask, and gloves to prevent exposure to the diluted CFT Legumine. In either case, applicators handling undiluted CFT Legumine and operators applying diluted CFT Legumine to surface waters would not be exposed to rotenone at levels that would be acutely toxic, as personal protective equipment would prevent exposure, and accidental exposure would be to low concentrations of rotenone.

Chronic exposure is repeated exposure from ingestion, inhalation, or dermal contact with the target chemical (EPA 2007). Chronic exposure, as defined in toxicity analyses for humans, is about 10% of the life span. Application of piscicide in Buffalo Creek would likely last 5 days, with treatments in 3 subsequent years. Applicators handling undiluted product have potential for brief contact with rotenone for considerably less than 10% of their life span; however, under label requirements they are required to wear personal protective equipment. Protective eyewear, coveralls, gloves, and dust and mist respirators provide ample protection against any contact with rotenone. Likewise, operators dispensing diluted CFT Legumine at drip stations or with backpack sprayers would wear personal protective equipment to prevent exposure.

Exposure to rotenone by eating dead fish is highly unlikely, and streams and lakes would be closed to the public during treatment. Signs posted at trailheads and access areas would inform the public of the presence of dead fish and alert people to not eat dead fish. Microbes work quickly on dead fish, so decay is obvious within a few hours, and these fish would not be appealing to humans looking for a meal. Signs warning the public and rapid onset of decomposition of dead fish would result in extremely low probability that humans would eat rotenone killed fish.

Although consumption of rotenone fish is unlikely, in the rare event someone ate rotenone-killed fish or fish that left the project area without receiving a lethal dose, this exposure would not result in a health risk. The EPA evaluated the potential dose of rotenone from eating dead fish. In each step of their analysis, they factored safety into their equations to develop a risk analysis that would be highly protective of human health (EPA 2007). The EPA chose safety levels for females 13-49 years old, as a potentially sensitive group (EPA 2007). In determining potential exposure from consuming fish, the EPA used maximum residues in fish tissues killed by rotenone. This concentration is a conservative estimate of potential exposure, as it includes rotenone accumulated in nonpalatable tissues other than muscle tissue, which would not likely be eaten by humans, but may have higher concentrations of rotenone. The EPA concluded that acute dietary exposure from the unlikely occurrence of eating rotenone-killed fish resulted in a dietary risk below their level of concern. Therefore, people eating rotenone-killed fish, despite posted warnings, would not face a health risk.

The EPA developed toxicological endpoints for several types of exposure to rotenone in treated waters and included uncertainty factors to ensure endpoints would be conservative and most protective of human health (EPA 2007). Rotenone projects would result in exposures far below the no observable effects level for acute dietary exposure, chronic dietary exposure, incidental short-term exposure from consumption of rotenone-killed fish, and short, intermediate, and long-term dermal exposure. Personal protective equipment worn by workers would reduce potential for exposure within this margin of safety. Closing public access to the streams and lakes are extra precautionary actions designed to provide added assurance that human health would not be at risk from rotenone projects.

The EPA concluded risks from chronic exposure to rotenone-treated water in streams brought low risk to humans (EPA 2007). Rotenone's rapid breakdown in the environment and deactivation with potassium permanganate would limit the duration rotenone is present in treated waters. The label prohibits use of rotenone near waters diverted for domestic use, and this remote watershed does not provide water for domestic uses.

The requirement that the public be notified of rotenone in treated waters would also protect human health for the short duration it is present in streams and lakes. Notifying the public through local papers, public meetings, and placing signs at trailheads and access points would alert the public to the presence of rotenone in treated water. A designated public relations person would be on-site to inform recreationalists of piscicide treatment, educate them about its use, and should prevent exposure to rotenone.

The temporary closure of waters to recreational uses is an added safety measure to protect human health. At application concentrations of less than 90 ppb of CFT Legumine, rotenone does not pose a threat to humans engaged in recreational activities after it is applied to water and has been mixed (EPA 2007). By comparison, concentrations of rotenone typical of fish removal projects in similar areas involving trout is unlikely to exceed 90 ppb for more than 48 hours and may never achieve this concentration in much of the project area. When the application level is lower than 90 ppb, signs may be removed, and the closure lifted immediately after the application is complete. For stream treatments exceeding the 90-ppb level, signs can be removed following a 24-hour bioassay demonstrating survival of fish, analytical chemistry showing less than 90 ppb rotenone, or 72 hours, whichever is less. For standing water treatments over 90 ppb, signs must remain posted for up to 14 days unless fish do not die during a 24-hour bioassay or rotenone is measured to be less than 90 ppb in the water.

The inert ingredients in CFT Legumine would not pose a threat to human health (Fisher 2007). Inert ingredients are primarily solvents and dispersants needed to dissolve and disperse the relatively insoluble rotenone. The emulsifier Fennedefo[99]™ comprises the bulk of the inert ingredients in CFT Legumine. This inert additive is a formulation of fatty acids, resin acids, and polyethylene glycols, which are common constituents in soaps, and other consumer products such as soft drinks, toothpaste, eye drops and suntan lotions. Its concentration in treated waters would be 2 ppm, which is many orders of magnitude lower than concentrations that are toxic, and it breaks down rapidly in the environment. Other trace constituents were organic compounds used in the extraction of rotenone from the plant material and were at minute concentrations and would be undetectable in streams or lakes and far below toxic concentrations. In contrast, Prenfish and other formulations of rotenone use organic solvents to dissolve and disperse rotenone, and CFT Legumine does not contain these chemicals except in trace amounts. The low toxicity and concentration of inert ingredients, combined with the rapid breakdown in the environment, would not pose a threat to human health or the environment.

The solvent n-methylpyrrolidone comprised 10% of CFT Legumine, and its concentration in treated waters would be around 2 ppm. The label for n-methylpyrrolidone provided toxicity information that confirms Fisher's assertion that this chemical would not be toxic as applied in piscicide projects (Fisher 2007). Mice exposed to 1,000 ppm/day for 3 months showed no adverse effects. The combination of its exceptionally low concentration in treated water and its rapid breakdown in the environment mean n-methylpyrrolidone would not present a threat to human health or the environment.

Concern over a potential link between rotenone and Parkinson's disease often emerges with piscicide projects. Research into the links between rotenone and Parkinson's disease include laboratory studies intended to induce Parkinson's-like symptoms in laboratory animals as a tool for neuroscientists to understand the mechanism of Parkinson's disease (Betarbet et al. 2001; Johnson and Bobrovskaya 2014), epidemiological studies of Parkinson's disease in farmworkers (Kamel et al. 2007; Tanner et al. 2011) and laboratory studies evaluating risks associated with inhalation of rotenone powder (Rojo et al. 2007).

These studies aimed at creating Parkinson's like lesions as a tool for neuroscientists to study the disease do not provide a relevant model for field exposure during piscicide treatments (Betarbet et al. 2001; Johnson and Bobrovskaya 2014). These studies entailed continuous injection of high concentrations of rotenone into the bloodstream, often with a chemical carrier to facilitate absorption, into tissues for long durations. Such studies differ substantially from piscicide projects in terms of dose, duration, and mode of delivery and are not relevant to this project.

Epidemiological studies have proposed a link between pesticide use in general and Parkinson's disease; however, definitive evidence of a causal link between rotenone exposure and Parkinson's disease has not been found, as results of epidemiological studies have been highly variable (Guenther et al. 2011). A widely cited study reported a positive correlation between agricultural use of rotenone with Parkinson's disease (Tanner et al. 2011); however, review of methodologies and assumptions in these studies demonstrates the difficulties in using epidemiological data in hazard identification (Raffaele et al. 2011). These after the fact studies cannot assess variability in rotenone formulations, dose, frequency of exposure, and whether workers used personal protective equipment. Moreover, exposure to other pesticides is a complicating factor, as farm workers usually have exposure to multiple pesticides.

Review of numerous studies evaluating exposure to rotenone as a risk factor for piscicide reveal conflicting results. Studies have found no correlations between pesticide exposure and Parkinson's disease (Guenther et al. 2011). Others have found correlations between pesticide exposure and Parkinson's disease (Hubble et al. 1993; C L Lai et al. 2002; Tanner et al. 2011), and some have found it difficult to determine which pesticide or pesticide class is implicated (Engel et al. 2001).

Epidemiological studies of pesticide exposure and risk of developing Parkinson's disease have numerous limitations that prevent identifying a definitive link between rotenone exposure and Parkinson's disease. These studies had numerous factors that limit the ability to confirm exposure to rotenone causes Parkinson's disease (Raffaele et al. 2011). Factors that do not allow for identifying rotenone as a health hazard is the variability of results among studies, the potential for misidentification of pesticide exposure scenarios, and questionnaire subjectivity (Raffaele et al. 2011). Parkinson's disease may have multiple causal factors, such as age, genetics, and other environmental exposures, which makes attributing Parkinson's disease to rotenone exposure unsupportable (Raffaele et al. 2011). The numerous deficiencies identified in the study evaluating risks of exposure of farmworkers to rotenone and paraquat (Tanner et al. 2011) were identified as confounding factors that limited certainty in the findings (Raffaele et al. 2011). Tanner et al. (2011) provided no information on the formulations of rotenone used, the frequency and dose farmworkers were exposed to, and whether they wore protective equipment. This deficiency in reporting limits the inference that can be drawn from the study. Moreover, farmworkers usually have exposure to multiple pesticides, which confounds efforts to link neurological disease to exposure to rotenone.

Application of rotenone in fish management projects is dissimilar to past application in agriculture, so these studies are not relevant to fish removal projects when conducted according to label requirements. CFT Legumine does not come in powder form, so it does not become airborne. The concentration of rotenone required to achieve a fish kill is minute, whereas the rate of application in agriculture is unknown. Finally, personnel handling rotenone wear protective equipment that prevents or minimizes exposure through inhalation, ingestion, and contact with skin. with use of personal protection equipment does not resemble exposure likely experienced by farmworkers, who may have not been wearing protective equipment and had greater potential for exposure to multiple pesticides.

No Action

Under the no action alternative, no chemicals would be released to surface waters.

Leave Fishless Option

Implementing the piscicide application portion of the project would result in the same risks to human health and require the same safety measures.

3.3.4 Community Impact

9. COMMUNITY IMPACT Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Alteration of the location, distribution, density, or growth rate of the human population of an area?		X				
b. Alteration of the social structure of a community?		X				
c. Alteration of the level or distribution of employment or community or personal income?		X				
d. Changes in industrial or commercial activity?		X				
e. Increased traffic hazards or effects on existing transportation facilities or patterns of movement of people and goods?		X				

3.3.5 Public Services/Taxes/Utilities

10. PUBLIC SERVICES/TAXES/UTILITIES Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Will the proposed action have an effect upon or result in a need for new or altered governmental services in any of the following areas: fire or police protection, schools, parks/recreational facilities, roads or other public maintenance, water supply, sewer or septic systems, solid waste disposal, health, or other governmental services? If any, specify: ______________		X				
b. Will the proposed action have an effect upon the local or state tax base and revenues?		X				
c. Will the proposed action result in a need for new facilities or substantial alterations of any of the following utilities: electric power, natural gas, other fuel supply or distribution systems, or communications?		X				
d. Will the proposed action result in increased used of any energy source?		X				
e. Define projected revenue sources		X				

3.3.6 Aesthetics and Recreation

11. AESTHETICS/RECREATION Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Alteration of any scenic vista or creation of an aesthetically offensive site or effect that is open to public view?		X				
b. Alteration of the aesthetic character of a community or neighborhood?		X				
c. Alteration of the quality or quantity of recreational/tourism opportunities and settings? (Attach Tourism Report)			X		Yes	See 11c
d. Will any designated or proposed wild or scenic rivers, trails or wilderness areas be impacted? (Also see 11a, 11c)		X				

Comment 11c: Alter Quality or Quantity of Recreation and Tourism Opportunities and Settings

Proposed Action

Removal of fish using CFT Legumine would result in temporary loss of angling at Hidden Lake and in streams within the project area. Catchable Yellowstone cutthroat trout would be stocked in Hidden Lake after rotenone has degraded to provide fishing opportunities in this lake, which currently provides recreational fishing. Yellowstone cutthroat trout would be stocked in streams in the Buffalo Creek watershed. The stream-dwelling populations would take up to 5 years to provide quality angling. The presence of work crews may affect hunters leading up to the goat, elk, and deer fall hunts. The current plan is to have crews away from typical goat hunting areas before September 1st and out of the basin before September 15th.

Restrictions to water resources will be implemented following label requirements of CFT Legumine. Signs will be posted at trailheads providing contact information and project timelines.

No Action

Recreation would remain unchanged if the project is not implemented.

Leave Fishless Option

This option would lead to permanent removal of fish, which would eliminate a recreational use that visitors to the Buffalo Creek watershed for 90 years.

3.3.7 Cultural and Historic Resources

12. CULTURAL/HISTORIC RESOURCES Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Destruction or alteration of any site, structure or object of prehistoric historic, or paleontological importance?		X				
b. Physical change that would affect unique cultural values?		X				
c. Effects on existing religious or sacred uses of a site or area?		X				12c
d. Will the project affect historic or cultural resources?		X				

Comment 12c: Effects on Existing Religious or Sacred Uses of a Site or Area

Proposed Action

The area is in the ancestral land of the Crow Tribe. Under state policy, FWP sent the cultural officers for the Crow Tribe a copy of the EA and letter requesting comment. To date, no cultural or religious resources have been identified within the project area. This project would have no ground-breaking activities, and no known cultural or religious ceremonies are planned for the project implementation period,

No Action

Not implementing the project would have no effect on cultural or historic resources.

Leave Fishless Option

This option would have a similar effect on cultural resources as the proposed action.

3.3.8 Summary Evaluation of Significance

13. SUMMARY EVALUATION OF SIGNIFICANCE **Will the proposed action, considered as a whole:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Have impacts that are individually limited, but cumulatively considerable? A project or program may result in impacts on two or more separate resources which create a significant effect when considered together or in total.		X				
b. Involve potential risks or adverse effects which are uncertain but extremely hazardous if they were to occur?		X				
c. Potentially conflict with the substantive requirements of any local, state, or federal law, regulation, standard or formal plan?		X				
d. Establish a precedent or likelihood that future actions with significant environmental impacts will be proposed?		X				13d
e. Generate substantial debate or controversy about the nature of the impacts that would be created?	X	X			Yes	13e
f. Is the project expected to have organized opposition or generate substantial public controversy? (Also see 13e)	X	X				13f
g. List any federal or state permits required.						13g

Comments 13e and 13f: Significant Impacts on Environment and Potential for Organized Opposition

Proposed Action

The use of rotenone can generate controversy from some people. The project is in designated wilderness and is the headwaters of Yellowstone National Park, so public interest may be considerable. Public outreach and informational programs can educate the public on the use of rotenone. It is not known if this project would have organized opposition.

No Action

Not implementing the project would not generate any direct opposition from the public. Not securing a population of Yellowstone cutthroat trout may garner opposition in the future, if it is perceived as a failure on the part of the state and federal agencies to abide by the MOU for cutthroat trout in Montana (MCTSC 2007). Yellowstone cutthroat trout would not benefit from establishment of a secure population.

Leave Fishless Option

This option brings the same potential for opposition associated with rotenone projects are the proposed action. In addition, opposition from outfitters, guides, and recreationalists who fish in the watershed could garner opposition.

Comment 13g: Required Federal or State Permits

Proposed Action

- MDEQ Pesticide General Permit
- Pesticide Use Permit for applying rotenone in designated wilderness
- Completion of the Minimum Requirement Decision Guide

No Action

Not implementing the project would result in no need to obtain permits or prepare a minimum requirements decision guide.

Leave Fishless Option

The piscicide portion of the project would require the same state and federal permits as the proposed action.

4 Public Comments Instructions

The public will be notified in the following manners to comment on this current EA, the proposed action and alternatives:

- Two public notices in each of these papers: Billings Gazette, Independent Record (Helena), Bozeman Chronicle.
- One statewide press release
- Public notice on the Fish, Wildlife & Parks web page: https://fwp.mt.gov/news/public-notices.
- Montana Fish Wildlife and Parks, Region 5 maintains a list of contacts that desire to be sent EA notices. This list includes partner agencies, counties, Citizen Advisory Council members, and other interested individuals. The entities on this list will receive notice.

The 34-day public comment period will begin on March 19, 2021 and comments must be received by April 21, 2021 by noon. A virtual meeting may be held if public interest warrants it. Comments can be emailed to: fwpregion5pc@mt.gov Please use header, **Buffalo Creek Project**. Mailed to Montana Fish, Wildlife & Parks, **Buffalo Creek Project**, 2300 Elmo Lake Drive, Billings, MT 59105. For additional questions or to leave a phone message comment please contact Mike Ruggles, at (406) 247-2961.

Comments pertaining to the U.S. Forest Service decision whether to authorize the proposed application of piscicide and associated motorized equipment operation in the Absaroka Beartooth Wilderness should be submitted to the U.S. Forest Service either:

- Electronically (preferred): in Word, PDF, or excel format, through the Forest Service's CARA database:

  https://cara.ecosystem-management.org/Public/CommentInput?Project=59630

- By Mail:

  ATTN: Buffalo Creek Yellowstone Cutthroat Trout Conservation
  Gardiner Ranger District
  PO Box 5
  Gardiner, MT 59030.

- Or hand delivery during regular office hours (8:00-4:30 Monday through Friday):

  Gardiner Ranger District
  805 Scott Street
  Gardiner, Montana

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